Wisconsin Department of Natural Resources

LOCATIONAL DATA STANDARDS

VERSION 1.1

This document updates
DNR Locational Data Standards (version 1.0 - dated 11/29/00).
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This document is also available on DNR's web site:
http://www.dnr.state.wi.us/org/at/et/geo/location/loc_stds.html

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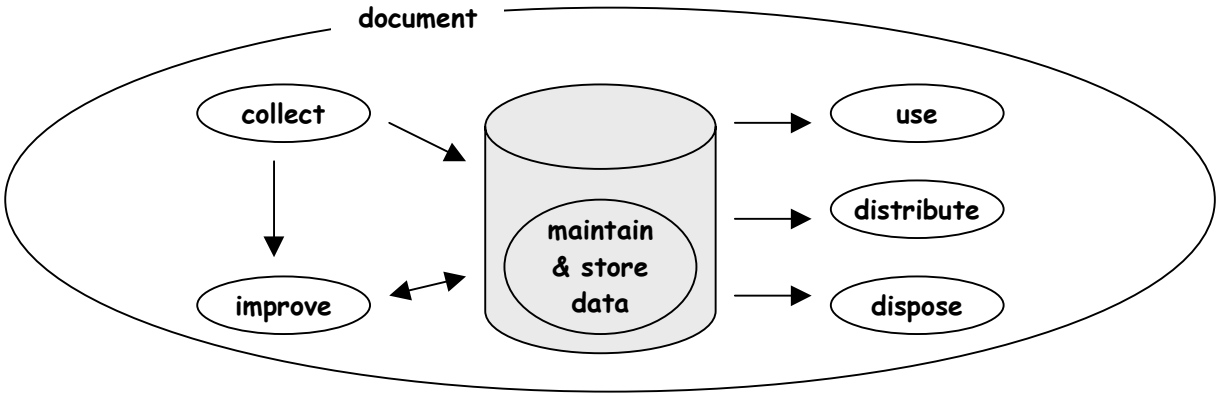
II. BACKGROUND INFORMATION

1. WHAT ARE LOCATIONAL DATA?

Locational data identify the "absolute" or "relative" position and position-related attributes of natural or man-made features and boundaries of Earth. Coordinates are an example of absolute feature locations, while street address and management unit are examples of relative locations. Locational data are sometimes referred to as "spatial" or "geospatial" data. Locational data and their "metadata" (i.e., descriptive data about data) can help answer questions such as…

What type of feature was located?
Where is that feature located on, above, or below the Earth's surface?
Which tool/technique was used to collect the location of that feature?
How accurate is the location of that feature?

Like all data, DNR's locational data have a life cycle that involves collection, improvement, maintenance and storage, use, distribution, and disposition activities. Proper and thorough documentation of each activity is important to ensure consistency, reduce redundancy, and promote integration of locational data throughout the agency.



DNR's locational data exist in a variety of formats and systems - paper maps and reports, tabular databases, spreadsheets, statistical and modeling applications, and geographic information systems (GISs). GIS tools and applications are specifically designed for collecting, improving, maintaining and storing, and using spatial data. The use of these tools by DNR programs and external partners continues to grow.

Agency staff, external partners, and other users need accurate locational data to make informed decisions about many different resource and facility management activities. DNR's goal is for locational data producers within the agency to continue to improve the quality of their data and metadata, and, as a result, continue to increase user confidence in those data and metadata. Both producers and users must consider the quality of the locational data in a "data set" (i.e., a collection of related data) in order to ensure that they can be used to support their specific business goals and needs.

2. ABOUT THIS DOCUMENT

Sections of this document are intended to provide information to specific audiences. ***Sections II -IV*** contain general information about locational data standards and considerations for all audiences. ***Sections V-VI*** contain information for DNR staff collecting locational data. ***Sections VIII-X*** provide information for users and distributors of DNR's locational data. Finally, ***Section VII*** and ***Appendices A-C*** are primarily intended for system and application developers.

It is hoped that this ***Locational Data Standards*** document becomes the foundation for all locational data related materials and activities within DNR. This document revises and replaces the existing *DNR Locational Data Policy* (Information Management Policy, Standards and Procedures Handbook, 9/19/96). These standards also update and replace sections of DNR's 1994 *GIS Database User's Guide*.

The reworking of these existing documents was done in response to concerns and needs expressed by DNR office and field staff, BEITA staff, external partners, and others. DNR's goal is to adopt locational data standards that are robust and compatible with other department-wide data and application standards, yet are flexible enough to support the unique business needs of each program. Producers and users of DNR's locational data must also find these standards easy to understand and use!

The contents of this document are dynamic. They will be reviewed regularly, and revised as necessary, to reflect changing DNR business needs, new technology, and the development of related standards and guidance. Full implementation of these locational data standards across DNR is expected to occur incrementally over time. Finally, this document references locational data materials and information from external sources where appropriate (see ***Section XII***).

Visit DNR's GIS Sections Intranet homepage for more information about the locational data topics covered in this document, or to contact us with questions!
http://intranet.dnr.state.wi.us/int/at/et/GEO/

3. WHY ARE DNR's LOCATIONAL DATA STANDARDS IMPORTANT?

Although developing and implementing standards can be somewhat controversial, department-wide adoption of these locational data standards can help:

- Facilitate access to and sharing of locational data among DNR programs, external partners, and other users, by providing a consistent, robust structure for:
  - Producers to collect, store and document their data.
  - Users to understand and assess the content and quality of the data.
  - Users to integrate data from different sources to meet their unique business needs.
- Minimize time, money and other resource costs associated with the collection, improvement, use, storage and maintenance, distribution, and documentation of redundant (and possible contradictory) locational data.

4. WHEN DO THESE LOCATIONAL DATA STANDARDS APPLY?

DNR's locational data standards apply to all department database systems and applications that describe the locations of real-world features or boundaries using any of the absolute or relative referencing systems described in this document! These standards do not mandate that any DNR program collect or use locational data!

a) Who Is Responsible for Implementing DNR's Locational Data Standards?

DNR program and BEITA staff are responsible for reviewing their locational data and related systems and applications, and determining if and how these standards apply to them. They are also responsible for adhering to these standards, as appropriate, throughout the life cycle of their data sets and database systems and applications. BEITA's Enterprise Data Management Section and the GIS Analysis and Mapping Services Section can help in these efforts. The following considerations can help producers and users determine when these standards apply to a specific data set, system, or application:

- The activity associated with the locational data in the data set, system or application.
- Whether the data element or field is required, recommended, or optional.
- Whether the data set, system or application is new/redesigned or existing.
- Differences in how x-y coordinates for features are stored in tabular and GIS applications and systems.
- How features in a data set are geometrically represented.
- Whether the data set is homogeneous or heterogeneous.

b) Standards for Locational Data Activities

The standards in this document are organized into sections, based on the activity with which the locational data are associated: collection, storage, use, documentation, and distribution. Although these standards focus primarily on data collection activities, standards for the other activities are discussed and defined as appropriate.

c) "Required", "Recommended", and "Optional" Locational Data

How and if locational data components are collected and stored depends, in part, on whether the data elements (i.e., for data collection) or the data fields (i.e., for data storage) are required, recommended, or optional. These conditions are also important in determining when these locational data components can be documented at the record level or at the data set (i.e., metadata) level (see ***Section II.4.g*** below).

d) New Versus Existing Data Sets, Applications, and Systems

These standards apply "day-forward" to **new and rewritten** database applications and systems that contain locational data. This means that applicable locational data fields in these "new" systems and applications must conform to these standards. In addition, all related data

entry screens and procedures must perform checks to assure the entry of valid data into appropriate data fields (unless entry of non-standard data is required for specific business needs).

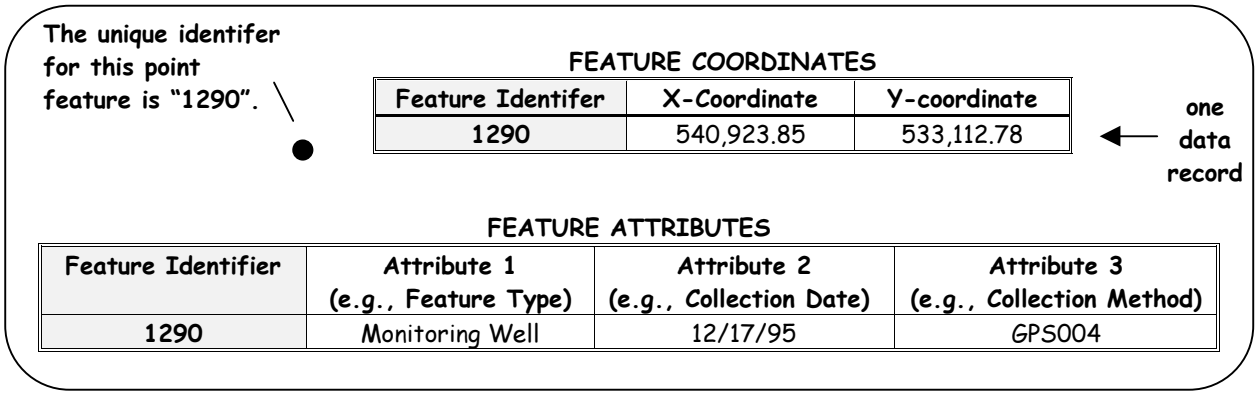
Whenever possible, **existing** database applications and systems must be brought into conformance with these standards. These standards acknowledge, however, that the improvement or conversion of existing data sets, applications and systems will occur over time. And, that these efforts are dependent on factors such as: (1) program business needs and priorities, (2) available resources, (3) regulatory or technical requirements, and (4) interdependence among existing data sets, systems and applications.

e) Feature Coordinates in Tabular Versus GIS Applications and Systems

DNR's locational data related systems and applications are developed using tabular database tools (e.g., Oracle, Microsoft Access), GIS tools (e.g., ArcView, ArcInfo), or a combination of the two. One of DNR's goals is to improve user access to all agency data by better integrating tabular and GIS data, systems and applications. Several strategic projects and new software tools (e.g., Spatial Database Engine and ArcIMS) will help facilitate these integration activities.

f) Geometric Feature Representation:

A real-world feature may be geometrically represented as a point, line, area, or as a collection of points, lines or areas on a map or in a GIS data layer. Each feature has x-y coordinates and associated attributes, which are all "linked" (or related) to each other by a "unique feature identifier", as illustrated below.



In both tabular and GIS applications and systems, feature attributes, including relative referencing system data, are managed in one or more linked "data records" (i.e., rows of data) in related data tables. X-Y coordinates, however, are managed differently in tabular and GIS applications and systems. This, in turn, affects the applicability of the *x-y* coordinate collection and storage standards defined in this document.

GIS Applications: A GIS automatically defines *x-y* coordinate data fields and internally maintains the "topology" (or spatial relationships) among these coordinates! Therefore, the

standard *x-y* coordinate data fields in this document do not apply to GIS data layers, applications or systems.

Tabular Database Systems and Applications: Tabular database systems and applications do not maintain the topology among feature *x-y* coordinates, and, therefore, they can store the *x-y* coordinates of point features only! The standard *x-y* coordinate data fields defined in this document do apply for point features in tabular database systems and applications.

g) Homogeneous Versus Heterogeneous Data Sets

All **required** data elements must be collected for all features being located, while all **recommended** data elements should be collected as applicable! However, deciding when to apply record-level versus metadata-level standards for storing and documenting locational data depends, in part, on the "homogeneity" (or uniformity) of the data set containing the locational data.

Homogeneous Data Sets: A data set is considered homogeneous, with respect to its locational data, if: (1) the following data elements are identical for all features in that data set, or (2) the differences among values in a particular element are so minor that they have little or no effect on the accuracy of feature locations in the data set. See ***Section V*** for more information about collecting these standard data elements.

HOMOGENEOUS DATA ELEMENT	EXAMPLE
Program-defined Feature Identifier	All features in the data set are assigned a Wisconsin unique well number (WUWN).
Feature Type Code (or set of related types)	All features in the data set are monitoring wells or are some type of public water supply well.
Feature Geometric Representation Code	All features in the data set are represented as points.
Original Horizontal (or Vertical) Referencing System Code	All feature locations in the data set are originally collected in WTM91 coordinates.
Original Horizontal (or Vertical) Collection Method Code	All feature locations in the data set are originally collected using mapping-grade GPS and differentially corrected using post-processing techniques.
Original Horizontal (or Vertical) Source Year, Denominator Amount, or Resolution Amount	If feature locations are digitized on-table or on-screen, the source maps or images (e.g., scanned topographic maps, or DRGs) have the same scale or resolution.

All **required** data fields must be stored and documented at the **record level** for homogeneous data sets! All other data elements may be documented at the metadata level, assuming that the metadata meet appropriate DNR standards (see ***Section IX***).

Heterogeneous Data Sets: A data set is considered "heterogeneous" if it does not meet the conditions for a homogeneous data set as described in the table above. Additional data fields are **required** and **recommended** for storing and documenting heterogeneous data sets at the record level.

III. CHANGES FROM PREVIOUS *LOCATIONAL DATA POLICY*

Refer to the companion documents, *Location Matters: Locational Data Basics* and *Location Matters: Data Accuracy Basics*, (expected completion in Spring, 2001) for detailed explanations of related topics!

1. STANDARDS ORGANIZED BY LOCATIONAL DATA ACTIVITY

The standards in this document are organized into sections by the activity with which the locational data are associated: collection, storage, use, documentation, and distribution. Although these standards focus primarily on data collection activities, standards for the other activities are discussed and defined as appropriate.

2. NEW VERTICAL LOCATIONAL DATA STANDARDS

The collection, use, and storage of altitude data (i.e., elevation and depth) are becoming more common in DNR. This document defines new vertical data standards. Vertical and horizontal data fields are defined separately because different referencing systems are used for each.

3. NEW "ORIGINALLY COLLECTED" LOCATIONAL DATA FIELDS

Several new data fields have been defined to capture characteristics about DNR's locational data as they were originally collected. Because most significant error is introduced during original collection activities, these data can help users determine the quality and, therefore, appropriate uses of the locational data.

4. STANDARDIZATION OF LOCATIONAL DATA FIELDS

Whenever possible, this document defines generic coordinate and attribute data fields. The only exceptions are explicitly defined data fields for Wisconsin Transverse Mercator and Latitude/Longitude coordinates, which are needed to meet specific DNR business needs and reporting requirements.

Standard Oracle abbreviations have been used in data field names and code values when available and appropriate, and new abbreviations have been developed and implemented as needed. Two sets of data field names have also been created: (1) one reconciled with DNR's standard Oracle classwords and 30-character maximum length requirements and (2) another reconciled with ArcView's 10-character maximum length for shapefiles using dBase tables. Finally, when possible, data fields containing numeric values (e.g., year) have been defined as numeric types, rather than as character types.

Both Oracle and Microsoft Access can accommodate data field names of 30 characters. Other commonly used database, spreadsheet, statistics, and modeling packages, however, may have different requirements (e.g., SAS allows 8). In these cases, users should define data fields names that meet that software's length requirements, but that have the same definitions and characteristics as the comparable fields defined in this document. A data field name *alias* (i.e.,

alternative name) table can help programs track these aliases, and better integrate data from different database systems and applications.

5. REQUIRED, RECOMMENDED, AND OPTIONAL LOCATIONAL DATA

These standards define when collecting specific locational data elements is required, recommended, or optional. It also describes if and how (i.e., record-level or metadata-level) the storage and documentation of collected data elements are required, recommended, or optional.

6. LOCATIONAL DATA QUALITY CONSIDERATIONS

Users must assess the **quality** of the locational data in a data set in order to determine if the data will adequately support their business needs. "Unknown data quality leads to tentative decisions, increased liability and loss of productivity. Decisions based on data of known quality are made with greater confidence and are more easily explained and defended."[1] The following components must be considered together when assessing the quality of locational data in a particular data set (also from Minnesota Land Management Information Center, 1999):

- ***Positional Accuracy:*** How closely the coordinate descriptions of features compare to their actual location.
- ***Attribute Accuracy:*** How thoroughly and correctly features in the data set are described.
- ***Logical Consistency:*** The extent to which geometric problems and drafting inconsistencies exist within the data set.
- ***Completeness:*** The decisions that determine what is contained in the data set.
- ***Lineage:*** What sources are used to construct the data set and what steps are taken to process the data.

This document addresses each of these data quality components to some extent, although most users tend to focus on the "positional accuracy" of locational data. DNR programs are required to define their data accuracy and related business requirements ***before*** collecting data, including:

- identifying the features to be located.
- ascertaining the degree to which those features can be "resolved" (i.e., clearly identified and delineated).
- ensuring that an appropriate data collection method (tool) is used.
- facilitating documentation of standard data collection procedures.

Refer to the companion document, *Location Matters: Data Accuracy Basics*, (expected completion in Spring, 2001) for a detailed explanation of locational data accuracy and related quality considerations!

7. DATA CONVERSION "CROSS-WALK" TABLES

Appendix C of this document contains "cross-walk" tables to help DNR programs convert existing locational data elements and fields (i.e., as defined in the 9/96 *DNR Locational Data*

[1] Minnesota Land Management Information Center, 1999.

Policy) to conform to these standards. These crosswalk tables must be used in conjunction with program-developed "data conversion rules" to help ensure that all converted data and data fields continue to support that program's business needs. Because improvement and conversion of DNR's existing data sets, applications and systems will occur over time, BEITA intends to maintain "old" standard codes and data fields as long as necessary.

8. NEW AND UPDATED "LOOK-UP" CODE TABLES

DNR's data architect/administrator maintains "look-up" tables that contain standard "enterprise" data codes, including several that relate to locational data. These codes must be used in all DNR database systems and applications. These department-wide (DW) tables are currently accessed through the Oracle-based *DAMenu* application (http://intranet.dnr.state.wi.us/int/at/et/).

This document updates existing codes and defines new codes for several existing look-up tables. It also defines new look-up tables and associated domains. The *DAMenu* application lists these look-up tables (also see description below and in ***Appendix B***). Equivalent U.S. Environmental Protection Agency (EPA) codes are also listed, where appropriate, to help users meet reporting requirements. BEITA intends to review *DAMenu* and its related procedures (e.g., How can a program request new codes to be added?). Modifications will be designed and implemented, as needed, to provide better integration and access for all users.

a) Data Collection Method Codes - Appendix B.1

This code describes the method by which the feature location was originally collected. Codes for horizontal data are stored in [ORIG_HRZ_COLL_MTHD_CODE]. Vertical data codes are stored in [ORIG_VRT_COLL_MTHD_CODE]. Equivalent EPA codes are also listed. This table also indicates if and how recommended data fields must be filled in for specific collection methods.

b) Referencing System Codes – Appendix B.2

This code describes the coordinate system or relative referencing system in which the data were originally collected. Codes for horizontal are stored in [ORIG_HRZ_REF_SYS_CODE]. Vertical data codes are stored in [ORIG_VRT_REF_SYS_CODE]. Referencing system name, datum, zone (as applicable), and unit are incorporated into the code values. Equivalent EPA codes are also listed.

c) Feature Type Codes – Appendix B.3

This code describes the type of feature being located, and is stored in [FEAT_TYPE_CODE]. The examples in ***Appendix B.3*** were compiled from several existing feature type lists within DNR. A comprehensive, department-wide feature type list does not exist! Developing an "enterprise" feature type list would help DNR programs consistently identify the types of real-world features being located, and help users better integrate data from multiple DNR sources. It would also facilitate object-oriented data modeling, and the development of standard symbol sets for presenting data to the public via the Internet.

d) Feature Geometric Representation Codes – Appendix B.4

This code describes how a feature is geometrically represented, and is stored in [FEAT_GEOM_REP_CODE]. Equivalent EPA codes are also listed. ***Note:*** A feature may be *stored* or *displayed* in a different geometric representation from the one in which it was *collected* in order to meet specific user needs.

e) Data Collection Tool Codes – Appendix B.5

This code describes the specific software or hardware tool used during original collection of the locational data. Codes for horizontal data codes are stored in [ORIG_HRZ_COLL_TOOL_CODE]. Vertical data codes are stored in [ORIG_VRT_COLL_TOOL_CODE]. These codes provide more detail about data collection activities and data quality.

f) County Codes – Appendix B.6

The DNR and Wisconsin Department of Revenue (DOR) county codes are stored in [DNR_CNTY_CODE] or [DOR_CNTY_CODE], as described in ***Sections V.3.a & b***.

g) Minor Civil Division (MCD) & Federal Information Processing System (FIPS) Codes

MCD and FIPS codes for Wisconsin's incorporated cities, towns and villages are listed in the ***DW_MCD*** table - accessed through the *DAMenu* application as described in ***Section III.8***. (http://intranet.dnr.state.wi.us/int/at/et/). These codes are stored in [MUNI_TYPE_CODE], [MCD_CODE] and [FIPS_CODE] data fields, and are used in parcel identifiers.

IV. LOCATIONAL DATA QUALITY CONSIDERATIONS

Producers and users of DNR's locational data must consider the following factors and situations when assessing the quality of feature locations in a DNR data set, application or system.

1. "ORIGINALLY COLLECTED" VERSUS "DERIVED" FEATURE LOCATIONS

a) Originally Collected Feature Locations

Capturing the following data about how a feature's location was originally collected is critical for determining the quality of the data. Because most significant error is introduced during data collection activities, noting the following conditions and characteristics is as important as collecting the original *x-y* coordinates! See ***Section V.1*** for descriptions of the standard data fields in which these data must be stored.

- **Program-defined feature identifier**
- **Original horizontal/vertical data collection method**
- **Original horizontal/vertical referencing system**
- **Original data collection date**
- **Original data source year**
- **Original data source scale or resolution**
- **Program-defined site identifier**
- **Feature type**
- **Feature geometric representation**
- **Original data collection tool**
- **Original data collector name**

b) Derived Feature Locations – Projection & Geo-Coding

Many times, a feature's x-y coordinates are derived from originally collected feature locations – or – from other derived coordinates in a different referencing system. For example, many private drinking water wells are originally located by Public Land Survey System (PLSS) description (e.g., NE NW S.34 T.12N R.23E). Wisconsin Transverse Mercator (WTM) coordinates are then derived from these PLSS descriptions, so that the data can be used in enterprise GIS applications and systems. Latitude/Longitude values may also be derived from the WTM coordinates for EPA reporting purposes.

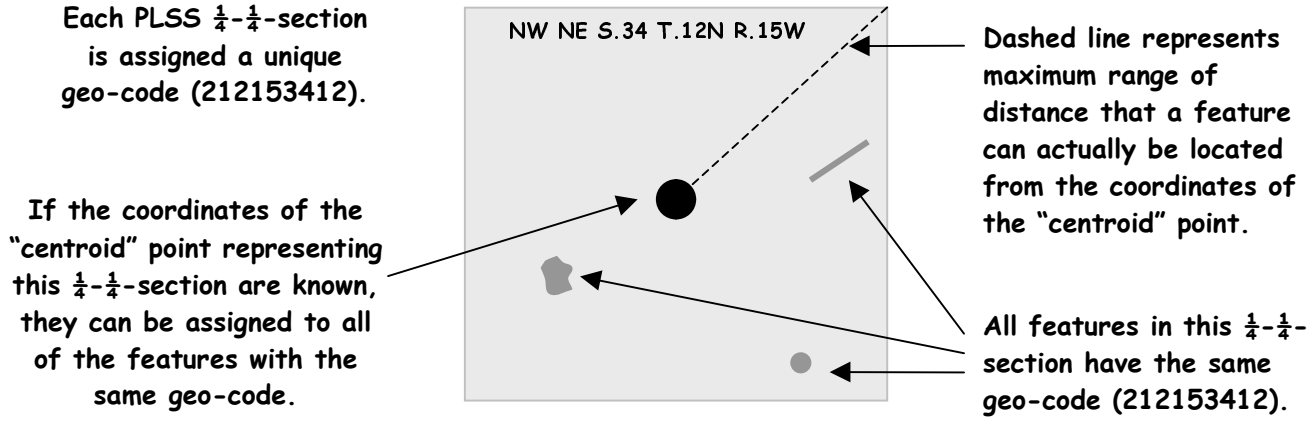
In this case, knowing the referencing system in which the well data were *originally collected* is vital for assessing the accuracy of the derived coordinates. The accuracy of derived coordinates is no better than the accuracy of the originally collected feature location from which they are derived! So…the WTM91 coordinates and latitude/longitude values for these wells are no more accurate than the PLSS descriptions from which they were derived. Deriving coordinates from other derived coordinates must be done carefully in order to avoid compounding errors and losing track of the real accuracy of the data! Coordinates are derived from other referencing systems using *projection* or *geo-coding* methods, as described below.

Refer to the companion document, *Location Matters: Locational Data Basics*, (expected completion in Spring, 2001) for more information about coordinate and relative referencing systems, GIS framework data layers, and related topics!

Projecting X-Y Coordinates from Other Coordinates: Because a coordinate system is a mathematically derived framework of *x-y* coordinates, coordinates stored in tabular databases and GIS data sets can be "projected" to derive other coordinates. Projection involves mathematically converting coordinates into another coordinate system (e.g., WTM into Latitude/Longitude), or changing the spheroid or datum to which the coordinates are referenced (e.g., NAD27 into NAD91). When using appropriate GIS tools and methods, projection errors for *x-y* coordinates are generally less than one meter. DNR does not have the capability to project vertical data between different vertical datums at this time!

DNR's *Projection Service* can help DNR staff project their locational data. Information about this service can be found at http://intranet.dnr.state.wi.us/int/at/et/GEO/prj_srvc.htm. Future releases of ArcGIS products are also expected to include "projection-on-the-fly" functionality. These products are not yet widely available, and their projection capabilities must still be tested and documented for use with DNR data sets, systems and applications!

Geo-coding Coordinates from Relative Referencing System Locations: Relative referencing systems assign a unique *geo-code* to specify the horizontal location of a feature. Public Land Survey System description, street address, and various management units are examples of commonly used relative referencing systems. The location of the feature is considered "relative" because the same geo-code references *all* of the features within a "unit" of the specified referencing system (e.g., PLSS grid cell, street address, management unit). The following diagram shows how geo-codes are assigned to features in a PLSS ¼-¼-section.



Each referencing system "unit" is represented by its "centroid" point, which is also assigned the geo-code of the unit. The x-y coordinates of that centroid point can be assigned to *all* the features within that unit. One result is that the true location of features in the unit may be some distance away from the centroid (see dashed line in the above illustration). In addition, all features in the same geo-coded unit will have identical x-y coordinates, and will appear "stacked" when displayed in a GIS.

DNR has added a centroid look-up table to ArcSDE/Oracle which allows users to get *x-y* coordinates, in either latitude/longitude or WTM91, that match PLSS descriptions (see

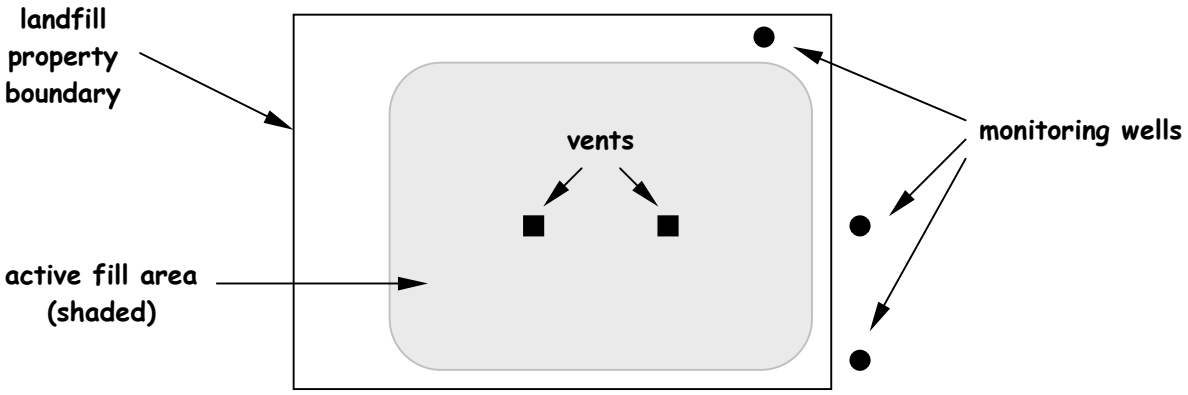
Section VII.2). DNR has also acquired software for deriving latitude/longitude coordinates from street addresses (see ***Section VII.4***).

c) DNR Framework GIS Data Layers

Linking locational data to one of the DNR GIS "framework" data layers is another way to derive feature coordinates. When appropriate, existing locational data in a tabular database or in another GIS data layer can be "snapped" to a framework layer (e.g., surface water, PLSS landnet) via customized tools. This method facilitates quality checking, integration and display of the data. See ***Section V.4*** and ***Section VIII.5*** for more information about GIS framework data layers.

2. AVOIDING CONFUSION: MULTIPLE FEATURES AT ONE SITE

The locations of several different types of features are often collected at or associated with one "site" (e.g., facility, property), as shown in the landfill example below. Depending on specific business needs, features of interest at a site can be located *individually*, or the site *as a whole* can represent some or all of the features located within or associated with it. Assigning a unique *Program-defined Site Identifer*, a unique *Program-defined Feature Identifier*, and a *Feature Type Code* to each feature can minimize any potential confusion. The link between the *Program-defined Site Identifier* and the *Program-defined Feature Identifier* can be thought of as a "parent-child" relationship (e.g., one or more "child" features associated with a "parent" site).



3. AVOIDING CONFUSION: MULTIPLE LOCATIONS FOR ONE FEATURE

The location of one feature is often collected many times by different DNR programs using different data collection methods to meet different business needs. The result is multiple locations for one feature that may (1) exist in different referencing systems, (2) have different accuracy, (3) characterize the feature differently (e.g., represent the feature as a point versus an area), or (4) exhibit some combination of 1–3 above. This approach can complicate the ability of producers and users of DNR's locational data to:

- know which location is the most accurate for a feature.
- keep multiple locations for a feature "in sync" (e.g., in the same general vicinity).
- retire/replace appropriate locational data when more accurate data become available.
- decide if multiple locations represent the *site as a whole* or if they represent *individually located features* associated with that site (see ***Section IV.2*** above).

Ideally, the following recommendations can help producers and users avoid confusion associated with multiple locations originally collected or derived for one feature.

- Whenever possible, capture the location of a feature only once, using the most applicable, accurate data collection method for the project. (*Assumes that the data may be re-captured if a more accurate data collection method and resources become available*).

- Whenever possible, use existing feature location data originally collected by another producer. (*Assumes that the data will adequately support the user's specific needs*).

- Whenever possible, derive coordinates from a feature's originally collected location, and not from other derived coordinates. (*Assumes that if multiple locations for one feature exist, the most accurate location is used as the source for deriving other coordinates*).

- Always capture the required and recommended "originally collected" data elements described in ***Section V.I***.

- Whenever possible, retire/replace a feature's locational data when more accurate data become available. (*DNR must develop and document department-wide procedures and rules for retiring/replacing feature location data. And, these rules and procedures must support program specific business needs.*)

V. COLLECTING HORIZONTAL LOCATIONAL DATA

Horizontal locational data describe the *x-y* positions of real-world features on a horizontal datum that represents the surface of the Earth. This section describes the required, recommended, and optional data elements associated with horizontal locational data collection activities. For the purposes of these standards, ***horizontal data collection activities*** involve the capture of feature locations and related data ***in the field*** (e.g., GPS or terrestrial surveying) or ***in the office*** (e.g., on-table or on-screen digitizing).

Refer to the companion document, *Location Matters: Locational Data Basics*, (expected Spring, 2001) for more detailed explanations about coordinate systems, relative referencing systems, GIS framework data layers, and related topics!

Locational and non-locational data for a feature may be collected separately, or at the same time, depending on the collector's specific business needs and the data collection method used. For example, programs often assign unique identifiers to features prior to data collection activities, and these identifiers may reside in existing database systems or applications along with related attribute data. Noting the assigned unique identifier during data collection activities can help the collector link all locational and non-locational data for that feature together.

1. "ORIGINALLY COLLECTED" HORIZONTAL DATA ELEMENTS

Regardless of the data collection method or referencing system used, capturing data about *how* a feature's horizontal location was "originally collected" is critical for assessing the quality of the data, and the quality of any other data derived from them. The following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

"ORIGINALLY COLLECTED" HORIZONTAL DATA ELEMENTS	
DATA ELEMENT DESCRIPTION	**COLLECTION REQUIREMENT**
A program intending to collect horizontal feature locations is required to collect, assign, know, or otherwise note the following 10 data elements (shaded) for all features.	
Program-defined Feature Identifier: Program-defined unique character or numeric identifier assigned to the feature being located. Example: WI Unique Well Number.	**Required for all located features**
Original Horizontal Collection Method Code: Code indicating the method by which the feature's horizontal location was originally collected. See ***Appendix B.1***.	
Original Horizontal Referencing System Code: Code indicating the referencing system in which the feature's horizontal location was originally collected. See ***Appendix B.2***.	
Original Horizontal Collection Date: Date on which the feature's horizontal location was originally collected.	

Original Horizontal X-Axis Coordinate Amount: Originally collected *x-axis* coordinate for point features in a tabular database system or application. *X-axis* coordinates include Easting and Longitude values.	**Required for applicable referencing systems**
Original Horizontal Y-Axis Coordinate Amount: Originally collected *y-axis* coordinate for point features in a tabular database system or application. *Y-axis* coordinates include Northing and Latitude values.	
Original Horizontal Source Year: The year that the source (e.g., map, imagery, DOP), from which the feature's horizontal location was originally collected, was created, published, updated, revised, flown, etc.	
Original Horizontal Source Denominator Amount: Scale denominator of the source (e.g., map, DOP photo base) from which the feature's horizontal location was originally colleted. Example: 24000 for 1:24,000 scale.	
Original Horizontal Image Resolution Amount: Pixel resolution of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's horizontal location was originally collected.	
Original Horizontal Image Resolution Units: Pixel resolution unit of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's horizontal location was originally collected.	

A program intending to collect horizontal feature locations is <u>recommended</u> to collect, assign, know, or otherwise note the following 6 data elements for all features.

Feature Type Code: Code indicating the type of feature being located. See ***Appendix B.3***. Required for some EPA reporting activities.	**Recommended for all located features**
Program-defined Site Identifier: Program-defined unique character or numeric identifier assigned to the site (e.g., facility, property, area) at which the feature is being located. Examples: FID, DNR Property Code.	
Feature Geometric Representation Code: Code indicating how the feature being located is geometrically represented. See ***Appendix B.4***. Required for some EPA reporting activities.	
Original Horizontal Collection Method Text: Additional detail about the method by which the feature's horizontal location was originally collected. See ***Appendix B.1***.	
Original Horizontal Collection Tool Code: Code indicating the tool used during the original collection of the feature's horizontal location. See ***Appendix B.5*** for domain.	
Original Horizontal Collector Name: DNR user ID (e.g., SMITHJ) or name of the person who originally collected the feature's horizontal location.	

The location of a feature may be originally collected in one of the following referencing systems:

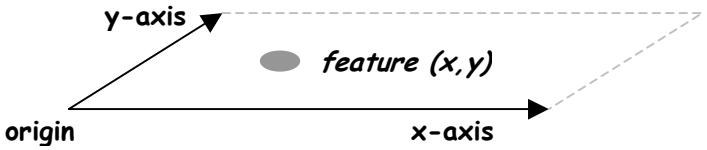
x-y coordinate system
"relative" referencing system
GIS "framework" data layer

Refer to the companion document, *Location Matters: Locational Data Basics*, (expected completion in Spring, 2001) for more detailed explanations of map projections, datums/spheroids, and specific coordinate systems!

2. COLLECTING *X-Y* COORDINATES

A coordinate system is a mathematically derived framework of *x-y* coordinates. Each coordinate system is defined by its unique combination of (1) *x-axis* and *y- axis* origins, (2) measurement unit, (3) reference datum or spheroid, and (4) map projection (if applicable). Theoretically, the location of *every* point on Earth's surface can be described by a unique *x-y* coordinate. DNR programs and external partners commonly collect the locations of features in one of the following *x-y* coordinate systems:

- **Wisconsin Transverse Mercator (WTM)**
- **Latitude/Longitude (LL)**
- **Universal Transverse Mercator (UTM)**
- **State Plane (SP)**
- **County Coordinate System (CCS)**



a) Collecting Wisconsin Transverse Mercator (WTM) Coordinates

Wisconsin Transverse Mercator (WTM) eastings (*x-axis*) and northings (*y-axis*) are always expressed in meters, and can be referenced to any datum. The WTM coordinate system referenced to NAD91/HPGN is known as the ***WTM91*** referencing system. All of DNR's GIS framework data layers are stored and managed in the WTM91 referencing system to simplify access to and use of these data sets. This also minimizes costs associated with developing and maintaining redundant data in multiple referencing systems. Please note that published USGS maps typically only show LL, UTM, and SP coordinates, and the Public Land Survey System section grid, but do not show WTM coordinates, because they are based on a "custom" map projection!

A DNR program intending to collect feature locations in a WTM referencing system should capture WTM91 coordinates, whenever possible. If a data collection method or tool does not allow WTM coordinates to be referenced to NAD91/HPGN, these coordinates should be referenced to (*in order of preference*): (1) NAD83 – the *WTM83* referencing system or (2) NAD27 - the *WTM27* referencing system.

WTM91 eastings and northings must have eight digits, with two to the right of the decimal point (e.g., 345678.12). Valid WTM91 coordinate ranges are:

	WTM91 NORTHING	WTM91 EASTING
Minimum Value:	211,000.00 m	285,000.00 m
Maximum Value:	740,000.00 m	776,000.00 m

If a DNR program intends to capture WTM91 coordinates, the following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data

elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

WISCONSIN TRANSVERSE MERCATOR (WTM) DATA ELEMENTS	
DATA ELEMENT DESCRIPTION	**COLLECTION REQUIREMENT**
A program intending to collect WTM91 coordinates is required to capture the following 2 data elements (shaded), in addition to all other required "originally collected" data elements.	
WTM91 Easting (X) Amount: WTM91 Easting defined as meters East of the WTM coordinate system y-axis based on the 1991 adjustment of the North American Datum of 1983 – GRS80 spheroid. Example: 652342.12.	**Required for all feature locations collected in WTM91**
WTM91 Northing (Y) Amount: WTM91 Northing defined as meters North of the WTM coordinate system x-axis based on the 1991 adjustment of the North American Datum of 1983 – GRS80 spheroid. Example: 652342.12.	

b) Collecting Latitude/Longitude (LL) Coordinates

In Wisconsin, latitudes (*y-axis*) are unsigned, positive values that increase from south to north, and are assumed north (N) of the Equator (e.g., 43.2936076 N). Longitudes (*x-axis*) are signed values (negative in the western hemisphere, e.g., -89.2534610 W), that increase from west to east (i.e., as the numeric value gets smaller, or closer to 0), with 0 degrees longitude being set at the Prime "Greenwich" Meridian in England.

Technically, latitude/longitude (LL) coordinates are referenced to a "spheroid" rather than to a "datum" since LL is a *spherical* system and not a *planar* one like WTM (i.e., datums only apply to planar coordinate systems). Whenever possible, non-survey level LL coordinates should reference (*in order of preference*): (1) the WGS84 spheroid or (2) the GRS80 spheroid. The difference in horizontal accuracy between these two common spheroids is in the millimeters range. Therefore, noting the particular spheroid is only necessary for survey-level applications, or when a spheroid other than WGS84 or GRS80 is used.

Some data collection methods or tools do not allow LL coordinates to be referenced to the WGS84 or GRS80 spheroid, or they only allow the data to be referenced to a datum rather than a spheroid. In these cases, LL coordinates should reference (*in order of preference*): (1) NAD91/HPGN, (2) NAD83, or (3) another spheroid. Valid Wisconsin LL coordinate ranges (WGS84 or GRS80 spheroid) are:

	LATITUDE	LONGITUDE
Minimum Value:	42.5000000 (DD) 42° 30′ 00.0000″ (DMS)	-93.0000000 (DD) -93° 00′ 00.0000″ (DMS)
Maximum Value:	47.5000000 (DD) 47° 30′ 00.0000″ (DMS)	-86.5000000 (DD) -86° 30′ 00.0000″ (DMS)

Decimal Degrees (DD) Versus Degrees/Minutes/Seconds (DMS) Notation: LL coordinates can be collected and stored in decimal degrees (DD), degrees/minutes/seconds (DMS), or other notations. Examples of DD and DMS notation for the same coordinates are shown below.

	DD NOTATION	DMS NOTATION
Latitude	43.2936076	43° 17′ 36.9878
Longitude	-89.2534610	-89° 15′ 12.4597

Whenever possible, LL coordinates should be collected and stored in decimal degrees. DD notation is much easier to use in mathematical calculations and in GIS applications. If LL coordinates are collected in DMS or other notation, they can be converted into DD as shown in the example below (e.g., converting 43° 17' 36.9878 DMS into 43.2936076 DD).

$$43\deg+\left(\frac{17\min}{60\min/\deg}\right)+\left(\frac{36.9878\sec}{3{,}600\sec/\deg}\right)=43\deg+0.2833333\deg+0.0102743\deg=43.2936076DD$$

LL Precision & Accuracy Considerations: DNR programs should collect LL coordinates to the appropriate accuracy level, based on their specific business needs and the capabilities of the data collection method or tool. As indicated in the table below, LL coordinates accurate to the centimeter level would have nine digits, with seven digits to the right of the decimal point (e.g., 45.1234567). However, the data collection method, and not the number of "significant digits" in coordinates, should be used to assess the accuracy of feature locations in a data set!

LL "Unit"	Accuracy Level (in meters)	Digit left/right of decimal point (in DD notation)	Latitude* (along Y-axis) Average Distance		Longitude** (along X-axis) Average Distance	
			meters	*feet*	*meters*	*feet*
Degree	10,000s – 100,000s meters	1st & 2nd left	111,045	364,316	78,849	258,688
Minute	1,000s meters	1st & 2nd right	1,851	6,072	1,314	4,311
Second	10s meters	3rd & 4th right	31	101	22	72
10th Second	1s meters	5th right	3	10	2	7
100th Second	10th meter	6th right	0.3	1	0.2	0.7
1,000th Second	100th meter (centimeter)	7th right	0.03	0.10	0.02	0.07

* (Conversion table from: Brinker, R.C. and P. R. Wolf, 1984) ** (Conversion table from: Robinson, A. H., *et. al.*, 1984)

If a DNR program intends to capture LL coordinates, the following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

LATITUDE/LONGITDUE DATA ELEMENTS	
DATA ELEMENT DESCRIPTION	**COLLECTION REQUIREMENT**
A program intending to collect LL coordinates (referenced to WGS84 or GRS80 spheroid) is required to capture the following 2 data elements (shaded), in addition to all other required "originally collected" data elements.	

Latitude Decimal Degree Amount: Decimal degrees of latitude North of the equator based on the WGS84 or GRS80 spheroid. Example: 42.1234567.	**Required for all feature locations collected in LL**
Longitude Decimal Degree Amount: Decimal degrees of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid. Example: -93.1234567.	

The following 6 data elements are optional for programs intending to collect LL coordinates in degrees, minutes, and seconds (DMS) notation (referenced to WGS84 or GRS80 spheroid).

Latitude Degree Amount: Degrees of latitude north of the equator based on the WGS84 or GRS80 spheroid.	**Optional**
Latitude Minute Amount: Minutes of latitude north of the equator based on the WGS84 or GRS80 spheroid.	
Latitude Second Amount: Decimal seconds of latitude north of the equator based on the WGS84 or GRS80 spheroid.	
Longitude Degree Amount: Degrees of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid.	
Longitude Minute Amount: Minutes of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid.	
Longitude Second Amount: Decimal seconds of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid.	

c) Collecting Other X-Y Coordinates

DNR programs often collect feature locations in coordinate systems other than WTM91 and LL to support specific business needs. A complete list of these coordinate systems is presented in the *Referencing System Codes* list (***Appendix B.2***). Standards for collecting *x-y* coordinates in some of the more common of these systems are described below. Regardless of the coordinate systems used, a DNR program must collect *x-y* coordinates to the appropriate accuracy level, based on its specific business needs and the capabilities of the data collection method or tool.

Universal Transverse Mercator (UTM) Coordinates: UTM eastings (*x-axis*) and northings (*y-axis*) are always expressed in meters. Wisconsin is divided roughly in half by two UTM zones – "western" zone 15 and "eastern" zone 16. Each zone has its own coordinate grid, which results in unsigned, positive coordinate numbers**.** A DNR program intending to collect UTM coordinates should reference them to one of the following datums (*in order of preference*): (1) NAD91/HGPN – the *UTM91* referencing system or (2) NAD83 - the *UTM83* referencing system. Valid Wisconsin UTM91 coordinate ranges are:

	MIN. NORTHING	MAX. NORTHING	MIN. EASTING	MAX. EASTING
UTM91 Zone 15	4,707,000.00	5,223,000.00	500,000.00	757,000.00
UTM91 Zone 16	4,691,000.00	5,141,000.00	243,000.00	520,000.00

UTM91 northings may have up to nine digits, with two digits to the right of the decimal point (e.g., 4712345.12), and eastings may have up to eight digits, with two to the right of the decimal point (e.g., 510654.12). However, the data collection method, and not the number of "significant digits" in coordinates, should be used to assess the accuracy of feature locations in a data set!

State Plane (SP) Coordinates: SP eastings (*x-axis*) and northings (*y-axis*) may be expressed in feet or meters, depending on the datum. Wisconsin is divided into three SP zones – north,

central and south. Each zone has its own coordinate grid, which results in unsigned, positive coordinate numbers. SP coordinates are commonly used by county or local agencies, and for survey-level data collection activities. A DNR program intending to collect SP coordinates should reference them to one of the following datums (*in order of preference*): (1) NAD91/ HGPN – the *SP91* referencing system or (2) NAD83 – the *SP83* referencing system. Valid Wisconsin SP91 coordinate ranges are:

	MIN. NORTHING	MAX. NORTHING	MIN. EASTING	MAX. EASTING
SP91 North Zone	22,860.00	218,237.00	365,304.00	854,813.00
SP91 Central Zone	4,572.00	244,450.00	365,304.00	855,118.00
SP91 South Zone	41,758.00	281,026.00	410,414.00	800,254.00

Both SP91 eastings and northings may have up to eight digits, with two digits to the right of the decimal point (e.g., 471234.12).). However, the data collection method, and not the number of "significant digits" in coordinates, should be used to assess the accuracy of feature locations in a data set!

County/Local Coordinate Systems: A unified set of coordinate systems for Wisconsin counties has been developed. This Wisconsin County Coordinate System (CCS) is designed so that each county (or group of neighboring counties) has its own coordinate system referenced to NAD91/HPGN. In addition, a county or local entity may create a customized coordinate system to meet specific business needs. Please refer to the *Wisconsin Coordinate Systems* (Wisconsin State Cartographer's Office. 1995) for more information about county/local coordinate systems.

Other Coordinate Systems: The *Referencing System Codes* list (***Appendix B.2***) contains common referencing systems used by DNR staff and external partners. Requests to add new referencing systems to this list can be emailed via **DNR's Locational Data Standards** homepage: http://www.dnr.state.wi.us/org/at/et/geo/location/loc_stds.html. BEITA's Enterprise Data Management Section also intends to add the *parameters* of each coordinate system to a future version of this list. These parameters will describe characteristics (e.g., spheroid, datum, origins, offsets) of these referencing systems to help DNR programs complete the metadata for their data sets (see ***Section IX***). These parameters will also facilitate "on-the-fly" projection functions available in new ArcGIS products.

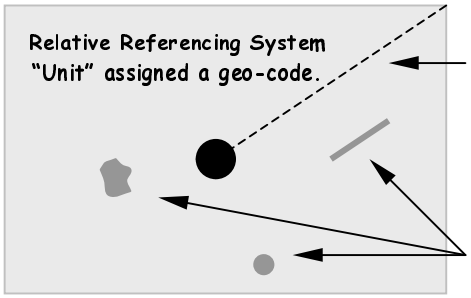
3. COLLECTING "RELATIVE REFERENCING SYSTEM" LOCATIONS

Refer to the companion document, *Location Matters: Locational Data Basics*, (expected completion in Spring, 2001) for more detailed explanations of relative referencing systems and related topics, including the Public Land Survey System, parcel descriptions, and street addresses!

As described in ***Section IV.1.b***, relative referencing systems assign a unique geo-code to specify the horizontal location of a feature. The location of the feature is considered "relative" because the same geo-code references *all* of the features within a "unit" of the specified referencing

system. In addition, the coordinates of the centroid point representing the unit can be assigned to the features in that unit (i.e., features that can be represented by a point). DNR programs and external partners commonly collect the locations of features in the following relative referencing systems:

- **Public Land Survey System (PLSS)**
- **Parcel Description**
- **Street Address**



a) Collecting Public Land Survey System (PLSS) Descriptions

The Public Land Survey System (PLSS) consists of a series of semi-regular grids, defined by state statute and administrative codes, which cover most of Wisconsin. Some parts of Wisconsin are not included in the PLSS! Townships (*y-axis*) and Ranges (*x-axis*) form the highest PLSS grid level. Townships increase from south to north, while Ranges increase to the west (for western Wisconsin) or to the east (for eastern Wisconsin) of a line centered on the 4th Principal Meridian. Valid ranges for Wisconsin's Township/Range grid cells are:

Township North (N)	Range West (W)	Range East (E)
1 – 53 N	1 – 20 W	1 – 30 E

Each Township/Range grid cell is divided into 36 sections, nominally 1 mile on a side. Sections are quartered to create a ¼-section grid, ¼-sections are quartered to create a ¼-¼-section grid, and so on. No PLSS grid cell, at any level, is a perfect square! A DNR program must collect PLSS descriptions to the appropriate accuracy level (i.e., ¼-section level or smaller), based on its business needs and the capabilities of the collection method or tool.

PLSS Quarter Codes: The following *PLSS Quarter Codes* must be captured and used in all DNR database systems and applications in which quarters of PLSS sections and smaller grid cells are described. Storage of numeric PLSS quarter codes is required – equivalent character codes may be stored *only in addition to* numeric codes.

Numeric Codes	Character Codes	Section/Quarter Description
0	UN	Unknown or Undefined Quarter
1	NE	Northeast Quarter of Section/Quarter
2	NW	Northwest Quarter of Section/Quarter
3	SW	Southwest Quarter of Section/Quarter
4	SE	Southeast Quarter of Section/Quarter
5	N2	North Half of Section/Quarter (NE + NW Quarters)
6	W2	West Half of Section/Quarter (NW + SW Quarters)
7	S2	South Half of Section/Quarter (SE + SW Quarters)
8	E2	East Half of Section/Quarter (NE + SE Quarters)
9	AQ	All Quarters of Section/Quarter (NE + NW + SE + SW Quarters)

PLSS Precision & Accuracy Considerations:

The following table shows the approximate acreage, maximum distance from the centroid point, and dimensions of idealized PLSS grid cell units. DNR programs can use this information to assess which grid cell level best supports their specific business needs.

PLSS Grid Cell	Approximate Acres	Approximate Maximum Distance from Centroid	Approximate Dimensions	
			meters	*feet*
Township/Range	23,040	6,828 meters	9,656 x 9656	31,680 x 31,680
Section	640	1,138 meters	1,609 x 1,609	5,280 x 5,280
$\frac{1}{4}$ Section	160	569 meters	804 x 804	2,640 x 2,640
$\frac{1}{4}\frac{1}{4}$ Section	40	284 meters	402 x 402	1,320 x 1,320
$\frac{1}{4}\frac{1}{4}\frac{1}{4}$ Section	10	141 meters	201 x 201	660 x 660
$\frac{1}{4}\frac{1}{4}\frac{1}{4}\frac{1}{4}$ Section	2.5	71 meters	100 x 100	330 x 330

Special Tracts NOT included in the PLSS: The following table describes non-standard survey areas (or "tracts") in Wisconsin that are not included in the PLSS. The Wisconsin Land Information Association (WLIA) and other state agencies have also adopted these codes. When a feature is located in one of these tracts, the value 0 must be captured for the *PLSS Section Number* and *PLSS Quarter-Section Number* data elements.

PLSS TRACT TYPE CODE	TRACT TYPE DESCRIPTION
05	Government Lot
06	Native American Claim (e.g., former reservations east of Lake Winnebago)
07	Mining Claim
08	Private Claim (e.g., lots north of Kaukauna, except those in Brown County)
09	Military Reserve (e.g., reserve in Green Bay)
10	Named grant or tract (e.g., "Williams Grant")
11	Farm Lot (e.g., in Prairie du Chien)
12	Upper Village Lot (e.g., in Prairie du Chien)
13	Half Range (e.g., resurvey area between Marinette and Oconto Counties)
14	Island
15	Main Village Lot (e.g., in Prairie du Chien)
16	Outagamie-Fox Elongated PLSS (along Fox River in Outagamie County)
28	Private Claim northwest of Fox River in Brown County
38	Private Claim southeast of Fox River in Brown County

Features Located in Multiple PLSS Grid Cells: Some features lie partially or wholly within multiple PLSS sections, ¼-sections, etc. How the PLSS descriptions for these features are collected depends on the business needs of the program, and the data model upon which the database system or application is built. One method is to collect multiple PLSS descriptions for one feature and store them as multiple records in a database system or application. Another technique involves using the following precedence rules to capture one PLSS description for the feature:

1) If appropriate, use the *PLSS Quarter Codes* above to describe the ½-section or ½-quarter in which the feature is located.
2) If the feature is located in more than one ½-section or ½-quarter, use the PLSS codes of the area within which the majority of the feature lies.
3) If relatively equal portions of the feature lie within several sections/quarters, use the codes of the easternmost area.
4) If there are multiple eastern areas of relatively equal portions, use the codes of the southernmost of these eastern areas.

If a DNR program intends to capture PLSS descriptions, the following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

PUBLIC LAND SURVEY SYSTEM (PLSS) DATA ELEMENTS

DATA ELEMENT DESCRIPTION	COLLECTION REQUIREMENT
A program intending to collect PLSS descriptions is required to capture the following 8 data elements (shaded), in addition to all other required "originally collected" data elements.	
PLSS Range Direction Numeric Code: Numeric code for the PLSS Range direction East or West of the 4th Principal Meridian.	**Required for all PLSS descriptions**
PLSS Township Identifier: PLSS Township (number) identifier.	
PLSS Range Identifier: PLSS Range (number) identifier.	
PLSS Section Identifier: PLSS Section (number) identifier. Capture "0" when feature is located in a non-standard PLSS tract.	
PLSS Quarter-Section Numeric Code: Numeric PLSS quarter-section code. See *PLSS Quarter Codes* above. Capture "0" when feature is located in a non-standard PLSS tract.	
PLSS Tract Type: Code representing the type of non-standard PLSS tract. See *Special Tracts NOT Included in the PLSS* above for domain.	**Required for all non-standard PLSS descriptions**
PLSS Entity Code: Code of the non-standard PLSS tract.	
A program intending to collect PLSS descriptions is recommended to capture the following 3 data elements, in addition to all other required PLSS and "originally collected" data elements.	
PLSS Quarter-Quarter-Section Numeric Code: Numeric PLSS quarter-quarter-section code. See *PLSS Quarter Codes* above. Capture "0" when feature is located in a non-standard PLSS tract.	**Recommended for all PLSS descriptions**
DNR County Code: DNR code for the county in which the feature is located. See ***Appendix B.6***.	
PLSS DTRSQQ Code: Geo-code for PLSS description. Created by concatenating the contents of the following data elements (and adding leading zeros where appropriate): *PLSS Range Direction Numeric Code* (1st digit); *PLSS Township Number* (2nd & 3rd digits); *PLSS Range Number* (4th & 5th digits); *PLSS Section Number* (6th & 7th digits); *PLSS Quarter-Section Numeric Code* (8th digit); and *PLSS Quarter-Quarter-Section Numeric Code* (9th digit). Example: 412230523.	**Recommended for all PLSS descriptions of features represented by the centroid point (i.e., not the area) of the PLSS unit**

The following 7 data elements are optional for programs intending to collect PLSS descriptions.

PLSS Quarter-Quarter-Quarter-Section Numeric Code: Numeric PLSS quarter-quarter-quarter-section code. See *PLSS Quarter Codes* above. Capture "0" when feature is located in a non-standard PLSS tract. Must be equivalent to *PLSS Quarter-Quarter-Quarter-Section Character Code* value.	**Optional**
PLSS Quarter-Quarter-Quarter-Quarter-Section Numeric Code: Numeric PLSS quarter-quarter-quarter-quarter-section code. See *PLSS Quarter Codes* above. Capture "0" when feature is located in a non-standard PLSS tract. Must be equivalent to *PLSS Quarter-Quarter-Quarter-Quarter-Section Character Code*.	
PLSS Range Direction Character Code: Character code for the PLSS Range direction East or West of the 4th Principal Meridian. Must be equivalent to *PLSS Range Direction Numeric Code*.	
PLSS Quarter-Section Character Code: Character PLSS quarter-section code. See *PLSS Quarter Codes* above. Capture "UN" when feature is located in a non-standard PLSS tract. Must be equivalent to *PLSS Quarter-Section Numeric Code* value.	
PLSS Quarter-Quarter-Section Character Code: Character PLSS quarter-quarter-section code. See *PLSS Quarter Codes* above. Capture "UN" when feature is located in a non-standard PLSS tract. Must be equivalent to *PLSS Quarter-Quarter-Section Numeric Code*.	
PLSS Quarter-Quarter-Quarter-Section Character Code: Character PLSS quarter-quarter-quarter-section code. See *PLSS Quarter Codes* above. Capture "UN" when feature is located in a non-standard PLSS tract. Must be equivalent to *PLSS Quarter-Quarter-Quarter-Section Numeric Code*.	
PLSS Quarter-Quarter-Quarter-Quarter-Section Character Code: Character PLSS quarter-quarter-quarter-quarter-section code. See *PLSS Quarter Codes* above. Capture "UN" when feature is located in a non-standard PLSS tract. Must be equivalent to *PLSS Quarter-Quarter-Quarter-Quarter-Section Numeric Code*.	

b) Collecting Parcel Descriptions

These standards define a "parcel" as an area of real property that can be defined by its geographic extent (i.e., location, shape, boundaries) and its legally recognized ownership. Parcel boundaries are usually described in narrative format on deeds. DNR's standard parcel data elements are compatible with the data exchange standards adopted by the Wisconsin Land Information Program (WLIP), WLIA and the "Uniform Parcel Number" format developed by the Wisconsin DOR and the Real Property Listers Association.

The terms "parcel identifier" and "parcel number" have specific meanings for the purposes of these standards. A parcel identifier is created by concatenating (or "stringing together") the following data elements, usually in the stated order: (1) *DOR County Code*, (2) *Municipality Type Code*, (3) *Minor Civil Division Code*, (4) *PLSS Range Direction Numeric Code*, (5) *PLSS Township Identifier*, (6) *PLSS Range Identifier*, (7) *PLSS Section Identifier*, (8) *PLSS Quarter-Section Numeric Code* and *PLSS Quarter-Quarter-Section Numeric Code* **OR** *PLSS Tract Type* and *PLSS Entity Code* (for non-standard tracts), and (9) *Parcel Number*.

The parcel number is just one component of the entire parcel identifier. Standard parcel numbers have 4 digits and are usually unique within a ¼-section or non-standard PLSS tract (see ***Section V.3.a***). Some counties, however, assign non-standard (i.e., 5+ digits) parcel numbers.

Assigning Parcel Identifiers: DNR does not assign parcel numbers or any other parcel identifier component! County/local Real Property Listers assign and maintain parcel identifiers for their jurisdictions. DNR receives parcel identifiers in one of two formats: (1) broken (or "parsed") into its individual components or (2) concatenated as one number, with or without dashes separating its individual components. Whenever possible, the individual components of the parcel identifier should be captured and stored in their respective data fields. If a DNR program is unable to distinguish or separate these components, it should ask the appropriate county/local agency to identify them – and also store the concatenated parcel identifier in the [PARCEL_NO] data field.

If a DNR program intends to capture parcel descriptions, the following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

PARCEL DESCRIPTION DATA ELEMENTS

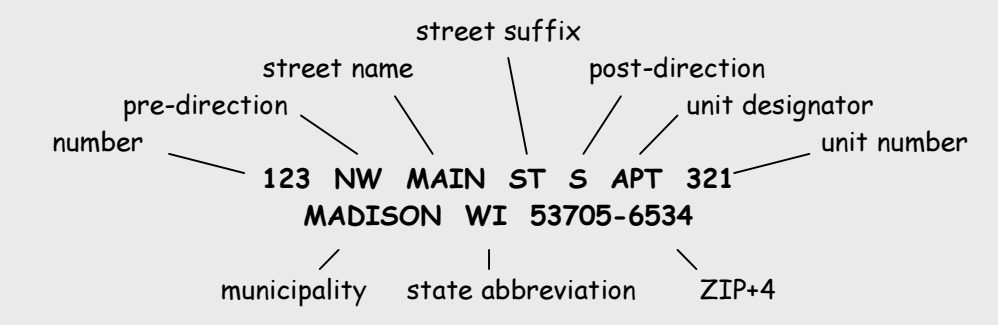
DATA ELEMENT DESCRIPTION	COLLECTION REQUIREMENT
A program intending to collect parcel descriptions is required to capture the following 12 data elements (shaded), in addition to all other required "originally collected" data elements.	
DOR County Code: Wisconsin Department of Revenue code for the county in which the feature is located. See ***Appendix B.6***.	**Required for all parcel descriptions**
Municipality Type Code: Numeric code representing the type of municipality in which the parcel is located. See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***).	
Minor Civil Division Code: Numeric code representing the specific minor civil division in which the parcel is located. See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***).	
PLSS Range Direction Numeric Code (See ***Section V.3.a*** for definition)	
PLSS Township Identifier (See ***Section V.3.a*** for definition)	
PLSS Range Identifier (See ***Section V.3.a*** for definition)	
PLSS Section Identifier (See ***Section V.3.a*** for definition)	
PLSS Quarter-Section Numeric Code (See ***Section V.3.a*** for definition)	
PLSS Quarter-Quarter-Section Numeric Code (See ***Section V.3.a*** for definition)	
PLSS Tract Type (See ***Section V.3.a*** for definition)	
PLSS Entity Code (See ***Section V.3.a*** for definition)	
Parcel Number: Standard or non-standard parcel number assigned by county/local "Real Property" Lister. May include dashes.	
The following 1 data element is optional for programs intending to collect parcel descriptions.	
Federal Information Processing System (FIPS) Code: Numeric FIPS code. See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***). Created by concatenating: *DOR County Code* (1st & 2nd digits); *Municipal Type Code* (3rd digit); and *Minor Civil Division Code* (4th & 5th digits).	**Optional**

c) Collecting Street Addresses

The street address of a feature is the address at which that feature is physically located. The street address of a feature ***may or may not be the same*** as the mailing address, contact

address, shipping address, or other addresses for that feature. For example, the mail for a facility may be sent to a Post Office (PO) Box or to the corporate headquarters (e.g., in another building, city, state, or country) of a company operating at a facility.

U.S. Postal Service Addressing Standards: The U.S. Postal Service (USPS) has adopted the following standard format for mailing addresses (U.S. Postal Service, 1999). USPS has also implemented capitalization, abbreviation, punctuation, and other standards. For example, address elements must appear in the prescribed order, all letters must be capitalized, and no punctuation, except for a dash in the zip code, is used.



DNR programs are <u>required to adhere</u> to this USPS address format when using street addresses to locate features for the following reasons:

- Standard names, abbreviations, capitalization, etc. helps users better compare and integrate street addresses from different database systems or applications.

- DNR's address geo-coding software provides more accurate coordinates for street addresses that meet USPS standards (see discussion below).

- If the street address and mailing address are the same, a standardized street address does not need to be "cleaned-up" before it can be used for mailings.

DNR programs can also <u>save postage costs</u> for bulk and direct mailings by conforming to USPS addressing standards! The USPS website is a good source of information about addressing standards. State, street suffix, and unit designator abbreviations can be found at: <u>http://www.framed.usps.com/ncsc/lookups/usps_abbreviations.htm</u>. Search engines for zip codes and city/state/zip code associations can also be accessed on the USPS website at <u>http://www.framed.usps.com/ncsc/lookups/lookups.htm</u>.

Features with Multiple Addresses: While it is impractical to use street addresses to locate some features (e.g., a monitoring well in the middle of a field), other features may have several different types of addresses associated with them, including PO Boxes. <u>These standards apply only to the street address at which a feature of interest is physically located</u>! DNR programs intending to locate a feature by its street address must (1) assess the practicality of this method for the particular feature type and "setting" of interest, and (2)

develop a process to identify the address that describes the true physical location of that feature.

If a DNR program intends to capture street addresses, the following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

STREET ADDRESS DATA ELEMENTS	
DATA ELEMENT DESCRIPTION	**COLLECTION REQUIREMENT**
A program intending to collect street addresses is required to capture the following 5 data elements (shaded), in addition to all other required "originally collected" data elements.	
Street Address Line 1 Text: The first line of street address, containing the following address components: number, pre-direction, street name, street suffix, post-direction. Example: 101 S WEBSTER ST.	**Required for all street addresses**
Street Address Line 2 Text: The second line of street address, containing the following address components: unit designator and unit number. Example: STE 24.	
Street Address Municipality Name: Incorporated city, town, or village name. See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***).	
Street Address State Abbreviation: The USPS U.S. state abbreviation. Example: WI.	
Street Address ZIP Code: The USPS U.S. zip code. Examples: 53717 or 537171134	
The following 5 data elements are optional for programs intending to collect street addresses.	
Street Address Number Data: The street number containing the following address components: number. Example: 101.	**Optional**
Street Address Name Text: The street name containing the following address components: pre-direction, street name, street suffix, post-direction: Example: S WEBSTER ST	
Street Address Unit Text: The street address unit containing the following address components: unit designator and unit number. Example: STE 24.	
Foreign Territory Text: The USPS foreign territory name or code.	
Foreign Postal Code: The USPS foreign territory postal code.	

4. GIS FRAMEWORK DATA LAYERS

One of DNR's strategic IT goals is to develop and maintain GIS framework data layers to reflect the most current and detailed *statewide* representations of geographical features of interest to DNR programs and external partners. Examples of these GIS framework data layers are surface water (1:24,000-scale hydrography), elevation, PLSS (1:24,000-scale Landnet), public land ownership, geographic management units (GMU), watersheds and sub-watersheds, and counties. These data sets are made available to internal DNR staff via the intranet or network, and distributed to each DNR regional office via CD. These data layers are also shared with other users via the procedures described in ***Section X***).

All GIS framework data layers are currently stored and managed in the WTM91 referencing system to simplify maintenance, minimize costs, and facilitate user access to and use of these data sets. These framework data layers can be used to derive the WTM91 coordinates for features in one of the following ways.

a) Deriving Relative Feature Locations from GIS Framework Data Layers

Each "unit" in a GIS framework data layer is assigned a unique geo-code, so the locations of features in a GIS framework unit can be represented by the WTM91 coordinates of that unit's centroid point. The geo-code can then be used to link the feature's WTM91 coordinates and attributes together for analyses, mapping, and reporting purposes. Examples of framework unit geo-codes are County Code, GMU Identifier, DNR Property Code, Watershed Code, Forest Compartment/Stand Identifier, and Water Body Identification Code.

If a DNR program intends to use a GIS framework data layer to capture feature locations, the following conditions must be true:

- An appropriate GIS framework data layer, referenced to WTM91, exists and has standard metadata.
- A unique geo-coding system exists for the "units" in the GIS framework data layer.
- The data collector uses the appropriate geo-code to associate the feature of interest with the correct GIS framework data layer unit.

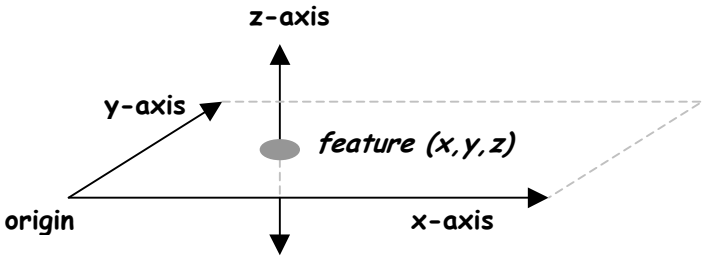
b) Deriving X-Y Coordinates from GIS Framework Data Layers

Several custom tools are also available or being developed to help programs integrate and display their data with GIS framework data layers. These tools can also facilitate data improvement and quality assurance efforts. For example, programs can use *the Surface Water Integration System (SWIS) Locator Tool* to "snap" existing program features to DNR's 1:24,000-scale surface water (or "hydrography") framework layer. The originally collected coordinates of program features may be retained, and new WTM91 coordinates are captured to indicate where a particular feature intersects the hydrography framework layer. It is **recommended** that DNR programs consider referencing appropriate feature data to a GIS framework data layer, especially as more custom tools become available.

VI. COLLECTING VERTICAL LOCATIONAL DATA

Refer to the companion document, *Location Matters: Locational Data Basics*, (expected completion in Spring, 2001) for more information about vertical data!

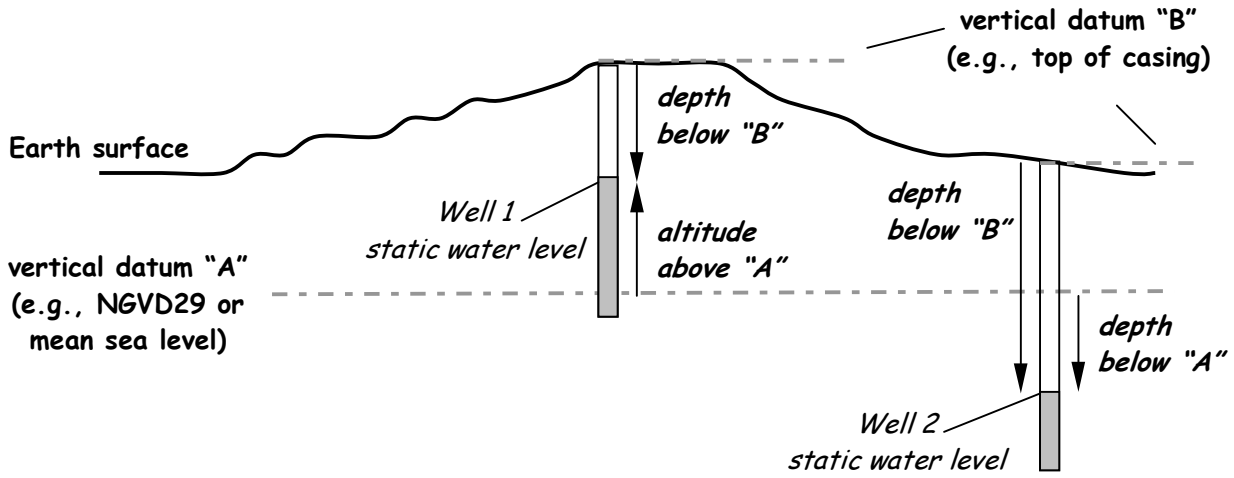
Vertical data describe the continuous surface of the Earth, or the position of a real-world feature above (*altitude*) or below (*depth*) the surface of the Earth as represented by a vertical datum. Vertical data are one-dimensional and represented by a *z-axis* value. Vertical and horizontal locational data are referenced to different datums.



It is **recommended** that a feature's altitude or depth be collected and recorded as an attribute linked to that feature's horizontal location! (The term "altitude" is used in this document instead of "elevation" to conform to Federal Geographic Data Committee standards.) It is also **recommended** that the same measurement unit be used to express the vertical and horizontal locations of a feature, whenever possible.

Vertical and horizontal locational data for a feature may be collected separately, or at the same time, depending on the collector's specific business needs and the data collection method used. For example, many GPS receivers are capable of capturing both horizontal and vertical data for a feature, although the accuracy of GPS vertical and horizontal data may differ significantly.

Deciding if a vertical measurement for a feature is an altitude or a depth value depends on the vertical datum to which it is referenced. As illustrated below, the static water level in *Well 1* may be measured as an altitude above vertical datum "A" or as a depth below vertical datum "B". The static water level in *Well 2* can be measured and expressed as a depth below vertical datum "A" or "B". Identifying the vertical referencing system and capturing appropriate altitude or depth data elements, are critical for properly assessing the quality of vertical locational data!



Because horizontal and vertical locations of a feature are linked, the following horizontal locational data elements also apply to a feature's vertical data (see ***Section V.1***): *Program-defined Feature Identifier* (required data element) and *Feature Type Code* and *Program-defined Site Identifier* (recommended data elements). This section describes the required, recommended, and optional data elements associated with vertical locational data collection activities. For the purposes of these standards, ***vertical data collection activities*** involve the capture of feature locations and related data ***in the field*** (e.g., GPS or terrestrial surveying) or ***in the office*** (e.g., on-table or on-screen digitizing).

1. "ORIGINALLY COLLECTED" VERTICAL DATA ELEMENTS

Regardless of the data collection method or referencing system used, capturing data about *how* a feature's vertical location was "originally collected" is critical for assessing the quality of the data, and the quality of any other data derived from them. The following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

"ORIGINALLY COLLECTED" VERTICAL DATA ELEMENTS	
DATA ELEMENT DESCRIPTION	**COLLECTION REQUIREMENT**
A program intending to collect vertical feature locations is required to collect, assign, know, or otherwise note the following 8 data elements (shaded) for all features.	
Program-defined Feature Identifier: (see ***Section V.1*** for definition)	**Required for all located features**
Original Vertical Collection Method Code: Code indicating the method by which the feature's vertical location was originally collected. See ***Appendix B.1***.	
Original Vertical Referencing System Code: Code indicating the referencing system in which the feature's vertical location was originally collected. See ***Appendix B.2***.	
Original Vertical Collection Date: Date on which the feature's vertical location was originally collected.	
Original Vertical Source Year: The year that the source (e.g., map, imagery, DOP), from which the feature's vertical location was originally collected, was created, updated, revised, flown, etc.	**Required for applicable data collection methods**
Original Vertical Source Denominator Amount: Scale denominator of the source (e.g., map, source photography of DOP) from which the feature's vertical location was originally collected. Example: 24000 entered for a 1:24,000 scale map.	
Original Vertical Image Resolution Amount: Pixel resolution of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's vertical location was originally collected.	
Original Vertical Image Resolution Units: Pixel resolution unit of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's vertical location was originally collected.	

A program intending to collect vertical feature locations is recommended to collect, assign, know, or otherwise note the following 5 data elements for all features.

Feature Type Code: (see ***Section V.1*** for definition)	**Recommended for all located features**
Program-defined Site Identifier: (see ***Section V.1*** for definition)	
Original Vertical Collection Method Text: Additional detail about the method by which the feature's vertical location was originally collected. See ***Appendix B.1***.	
Original Vertical Collection Tool Code: Code indicating the tool used during the original collection of the feature's vertical location. See ***Appendix B.5***.	
Original Vertical Collector Name: DNR user ID (e.g., SMITHJ) or name of the person who originally collected the feature's vertical location.	

2. COLLECTING ALTITUDE (or ELEVATION) DATA ELEMENTS

It is recommended that DNR programs collect altitude data in reference to the National Geodetic Vertical Datum of 1929 (NGVD29), whenever possible. This datum was chosen as the standard for DNR's elevation GIS framework data layer because most U.S. Geological Survey (USGS) paper maps and digital elevation products use this datum. DNR does not have the capability to project vertical data between different vertical datums at this time! A future project of the Enterprise Data Management Section will be to investigate and develop procedures for vertical data projection.

Using GPS Tools to Collection Altitude Data: Many GPS receivers can collect both vertical and horizontal locational data for a feature. In almost all cases, vertical data collected with a GPS are 2-3 times *less accurate* than the horizontal data. For example, if the horizontal data accuracy is 2-5 meters, the vertical data accuracy can be 15+ meters. The one exception is survey-grade GPS tools, which produce highly accurate horizontal and vertical data.

If a DNR program intends to capture altitude data, the following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

ALTITUDE DATA ELEMENTS	
DATA ELEMENT DESCRIPTION	**COLLECTION REQUIREMENT**

A program intending to collect feature altitude data is required to capture the following 2 data elements (shaded), in addition to all other required "originally collected" data elements.

Altitude Amount: The altitude of a feature, measured in *Altitude Units*, above the vertical datum specified in the *Original Vertical Referencing System Code* data element.	**Required for all altitude data**
Altitude Units: Units in which the altitude of a feature is measured.	

3. COLLECTING DEPTH DATA ELEMENTS

As with altitude data, it is recommended that DNR programs collect depth data in reference to NGVD29, whenever possible. In practice, however, many DNR programs measure depth from a local surface or point, which ***may or may not*** be referenced to NGVD29. Each DNR program is responsible for selecting the collection method or tool that best supports its business needs for depth data. These standards simply define the depth-related data elements that must be captured.

For example, NR141 (Wis. Adm Code) requires that the top of a monitoring well casing be referenced to the nearest NGVD29 benchmark. The depth of the static water level in a monitoring well, however, is typically measured and recorded as the distance from the top of the well casing to the water table. (In this case, the static water level in a monitoring well *could* be calculated in reference to NGVD29 by using the well casing measurements.) It is especially important to note a custom or local vertical datum (i.e., not NGVD29 or NAVD88) used when collecting depth data (i.e., in the [ORIG_VRT_COLL_MTHD_TEXT] data field).

If a DNR program intends to capture depth data, the following data elements are to be collected, assigned, known, or otherwise noted during locational data collection activities. DNR programs must always collect **required** data elements (shaded) under the prescribed conditions! And, programs must make the decision to collect **recommended** and **optional** data elements, based on a thorough assessment of their business needs. Standard data field names, characteristics, and storage requirements for these data elements are defined in ***Appendix A***.

DEPTH DATA ELEMENTS	
DATA ELEMENT DESCRIPTION	**COLLECTION REQUIREMENT**
A program intending to collect feature depth data is required to capture the following 2 data elements (shaded), in addition to all other required "originally collected" data elements.	
Depth Amount: The depth of a feature, measured in *Depth Units*, below the vertical datum specified in the *Original Vertical Referencing System Code* data element.	**Required for all depth data**
Depth Units: Units in which the depth of a feature is measured.	

VII. STORING LOCATIONAL DATA

After a DNR program collects or assigns the standard horizontal and vertical data elements described in the preceding sections, it must decide where and in what format to store the data. This section describes required, recommended, and optional data fields for storing horizontal and vertical data elements in DNR's database systems and applications. For the purposes of this document, ***locational data storage activities*** involve the storage and maintenance of locational data ***at the record level*** (i.e., in defined, standard data fields). Appropriate documentation of standard locational data elements *at the metadata level* is described in ***Section IX***.

DNR programs currently store their locational data in a variety of GIS, database, spreadsheet, statistical, and modeling software formats. This approach is flexible, but can hinder the ability of users to access and integrate locational data from multiple sources within the agency. The locational data storage standards defined in this document are intended to help users:

- efficiently integrate data from multiple DNR sources to meet specific business needs.
- better understand and assess the content and quality of DNR's locational data.
- eliminate redundant storage of locational data within DNR.

Data producers must consider several factors when deciding where and in what format to store the locational data they have collected:

- Some data fields are required in database systems and applications, while others are recommended or optional.

- How *x-y* coordinates are stored differs for tabular database and GIS applications and systems.

- Storing data elements at the record level versus the metadata level depends on the homogeneity of the locational data in a data set.

1. REQUIRED, RECOMMENDED, AND OPTIONAL LOCATIONAL DATA FIELDS

Appendix A lists standard data field names, characteristics, and storage requirements associated with the "collected" locational data elements described in ***Sections V*** and ***VI*** above. DNR programs must always build **required** data fields into applications and systems that contain locational data! In addition, the data in these required data fields must always be stored and documented at the record level. Programs must make the decision to build **recommended** and **optional** data fields into these applications and systems, based on a thorough assessment of their business needs.

VIII. USING LOCATIONAL DATA

The agency's GIS framework data layers are referenced to WTM91 for the reasons described in ***Section V.4***. A DNR program intending to use (e.g., map, display, analyze) its data internally, in conjunction with one or more GIS framework layers, should collect or derive WTM91 coordinates for its data, or otherwise make its data available in the WTM91 referencing system. This recommendation applies to data stored in tabular and GIS applications and systems. Please note that this recommendation does not preclude a DNR program from collecting, storing or using locational data in another referencing system when necessary to support its unique business needs.

For example, both the PLSS descriptions and WTM91 coordinates for private drinking water wells are collected, stored and used for specific purposes. The PLSS description is used to query customized database systems and applications, while the WTM91 coordinates are used to display wells in reference to other framework data layers in GIS applications. The Latitude/Longitude coordinates for these wells are also derived for specific EPA reporting requirements.

See ***Appendix A*** for WTM91 data field specifications. Recommendations on deriving WTM91 coordinates from other coordinate and relative referencing systems are described below.

1. DERIVING WTM91 COORDINATES FROM OTHER COORDINATES

DNR's "Projection Service" (http://intranet.dnr.state.wi.us/int/at/et/GEO/prj_srvc.htm) can help DNR programs project WTM91 coordinates from feature locations originally collected in other coordinate systems (e.g., WTM27, Latitude/Longitude, UTM, SP). This service can project horizontal data in tabular and GIS applications and systems.

2. DERIVING WTM91 COORDINATES FROM PLSS DESCRIPTIONS

DNR has developed a PLSS centroid look-up table (named *DTRSQQ_LUT*) to help programs derive WTM91 (or Latitude/Longitude) coordinates for features that can be represented by the "centroid" point of a PLSS Township/Range, section, ¼-section, or ¼-¼-section grid cell. This table contains data from DNR's 1:24,000-scale Landnet GIS framework data layer, and resides in ArcSDE/Oracle. Users can access this table through ArcSDE or from a client to *production* Oracle via a database link pointing to the ArcSDE/Oracle instance. A future project of the Enterprise Data Management Section will be to investigate and develop a PLSS centroid service. Questions about this look-up table can be emailed via the **PLSS Centroid Table** homepage: http://intranet.dnr.state.wi.us/int/at/et/geo/location/plss_centroid_tbl.html.

The [PLSS_DTRSQQ_CODE] data field defined in this document holds the geo-code used to link WTM91 coordinates to each applicable PLSS grid cell. The PLSS "centroid" table can be used to derive WTM91 coordinates even when feature locations within the same data set are described to different PLSS grid cell levels. Non-standard PLSS tracts, half sections, and half quarters, however, are not included in the current 1:24,000-scale Landnet data layer. As a result, the geo-codes for these tracts are not included in the PLSS "centroid" look-up table, and the WTM91 coordinates for features in these tracts must be collected using other

methods! WTM91 coordinates that describe (i.e., bound) *area* features located by PLSS descriptions must also be derived through other methods, such as digitizing or projection.

3. DERIVING WTM91 COODINRATES FROM PARCEL DESCRIPTIONS

WTM91 coordinates for features represented by parcel "centroid" points can be derived using the same process that is used to derive WTM91 coordinates from PLSS descriptions. This same process works because parcel identifiers contain the components necessary to derive the PLSS geo-codes contained in the [PLSS_DTRSQQ_CODE] data field, and used in the PLSS centroid look-up table. When a feature is best represented as an *area*, another method must be used to derive its WTM91 coordinates. For example, DNR has digitized a GIS framework data layer of DNR managed lands (i.e., parcels) which is referenced to WTM91.

4. DERIVING WTM91 COORDINATES FROM STREET ADDRESSES

The process of converting street addresses into WTM91 (or other) coordinates is called address geo-coding. A street address is used to derive a point that represents one or more features located at that address. As with all relative referencing systems, a feature located by street address can be located anywhere within the property designated by that address, and can be within a range of distance from the point representing that address.

DNR has acquired *Centrus Desktop™* address standardization and geo-coding software, and provides consulting services to help programs with their address geo-coding, standardization, and related activities. (For more information, see DNR's **Address Standardization and Geo-Coding** web page: http://intranet.dnr.state.wi.us/int/at/et/geo/location/addressmatch.html.) ArcView GIS software has an extension that uses *Dynamap 2000* data for address geo-coding. However, *Centrus Desktop™* is recommended for address standardization and geo-coding activities within DNR for the following reasons:

- address data are updated every two months
- several sources of address data are used (i.e., GDT, USPS)
- "match codes" allow users to assess how addresses have been standardized
- "location codes" allow users to assess the accuracy of derived coordinates

5. DERIVING WTM91 COORDINATES FROM GIS FRAMEWORK DATA LAYERS

Because DNR's GIS framework data layers are stored and managed in WTM91 coordinates, features located using the geo-code for a framework "unit" can be assigned the WTM91 coordinates of that unit's "centroid" point. In addition, WTM91 coordinates are also generated for features "snapped" to one of these GIS framework data layers.

IX. METADATA – DOCUMENTING LOCATIONAL DATA SETS

Standard metadata must be developed and made available for each DNR tabular and GIS data set that contains locational data. DNR has adopted the Federal Geographic Data Committee's (FGDC) metadata standards for its GIS framework data layers, with additional elements added to support specific program needs (e.g., Aquatic and Terrestrial Resource Inventory Internet application). FGDC metadata elements are considered mandatory, mandatory-if-applicable, or optional.

When a data set containing locational data is considered "homogeneous" (see ***Section II.4.g***), some of the collected data elements may be documented solely in that data set's metadata, and not also stored in standard data fields within that data set. The following FGDC metadata elements are related to the locational data in a data set. The quoted FGDC definition of each metadata element comes directly from the FGDC standards document, *Content Standard for Digital Geospatial Metadata* (United States Geological Survey, 1998). Please refer to the FGDC standards for the domains of the following metadata elements.

1. IDENTIFICATION INFORMATION

a) Spatial Domain

"The geographic areal domain of the data set." The spatial domain is defined as (1) a text description or (2) by its bounding horizontal coordinates (western-, eastern-, northern-, and southern-most limits of area covered by the data set), boundary outline, excluded interior area boundaries, and minimum and maximum altitude values. The values for the horizontal spatial domain elements must be entered as Latitude/Longitude decimal degrees (see ***Section V.2.b***).

2. DATA QUALITY INFORMATION

a) Positional Accuracy

"An assessment of the accuracy of the positions of spatial objects" in the data set. Positional accuracy is described separately for horizontal and vertical locations in the data set. Positional accuracy may be estimated or formally tested. In some cases, a specific number or number range can describe the accuracy of the data (e.g., a formal statistical test has been conducted). In other cases, the accuracy of positional data may be difficult or impossible to represent numerically, and must be described verbally. The informal or formal method used to determine accuracy must also be described. The ***Location Matters: Data Accuracy Basics***, (expected in Spring, 2001) contains more detailed information about data accuracy issues.

3. SPATIAL DATA ORGANIZATION INFORMATION

a) Indirect Spatial Reference

"Name of types of geographic features, addressing schemes, or other means through which locations are referenced in the data set." This element refers to *relative referencing systems*

used to locate features. FGDC relative referencing system descriptions (shaded column) for the following *Original Horizontal Collection Method Code* (stored in the [ORIG_HRZ_COLL_MTHD_CODE] data field are used to fill this element:

[ORIG_HRZ_COLL_MTHD_CODE]	FGDC Relative Referencing System Description
GCD001 - GCD004	Public Land Survey System Description
GCD005 – GCD013	Street Address
GCD014	Parcel Description

b) Direct Spatial Reference Method

"The system of objects used to represent space in the data set." FGDC sets the domain of this element as point, vector, or raster. More detailed characteristics about the point/vector or raster objects comprising the data set can also be entered into optional metadata fields. The ***Location Matters: Locational Data Basics*** document (expected completion in Spring, 2001) contains more information about vector and raster data. FGDC direct spatial referencing methods (shaded column) are listed for the following data set characteristics.

Data Set Characteristics	FGDC Direct Spatial Reference Method
• X-Y coordinates in a tabular database system or application • GIS data layers containing point feature • All geo-coded data sets	**Point**
• GIS data layers containing lines, areas (polygons), routes or regions (using *x-y* coordinates)	**Vector**
• Scanned maps, photos, etc. • Digital orthophotos (DOPs) • Digital raster graphics (DRGs) • Satellite imagery • Continuous surfaces (e.g., elevation) • Categorical surfaces (e.g., Wisconsin land cover)	**Raster**

4. SPATIAL REFERENCE INFORMATION

a) Horizontal Coordinate System Definition

"The reference frame or system from which linear or angular quantities are measured and assigned to the position that a point occupies." The value in the [ORIG_HRZ_REF_SYS_CODE] data field can be used to fill in these metadata elements. Different elements are mandatory for geographic coordinates (latitude/longitude), planar coordinates (WTM91, State Plane, UTM), and local coordinates. The required metadata parameters for horizontal referencing systems commonly used in Wisconsin will ultimately be listed in an updated version of ***Appendix B.2***.

b) Vertical Coordinate System Definition

"The reference frame or system from which vertical distances (altitudes or depths) are measured." The value in the [ORIG_HRZ_REF_SYS_CODE] data field can be used to fill in these metadata elements. The required metadata parameters for horizontal referencing systems commonly used in Wisconsin will ultimately be listed in an updated version of ***Appendix B.2***.

5. ENTITY ATTRIBUTE INFORMATION

FGDC metadata standards allow two options for describing the data entities (e.g., data fields) in a data set. A detailed description for each entity can be provided, or an overview description can refer the user to another document that describes the entities in the data set.

a) Detailed Description

"Description of entities, attributes, attribute values, and related characteristics encoded in the data set." The data field names, definitions and domain values defined in this document can be used to provide detailed descriptions of the locational data entities in a data set.

b) Overview Description

"Summary of, and citation to detailed description of, the information content of the data set." The overview description can refer users to this document for information about the locational data elements in a data set.

X. DISTRIBUTING LOCATIONAL DATA

DNR shares (i.e., provides and receives) data with many local, state and federal agencies, private organizations, and others. Some of these data sharing arrangements are formalized as part of a contract or agreement, while others are more informal. In addition, to support specific business requirements (e.g., reporting to EPA) data may be reported in a format different from that in which they were collected.

DNR also provides GIS framework data layers and customized applications, such as DNRView, to internal users via the intranet, network, or CD. Please refer to the companion document, *Wisconsin DNR GIS Datasharing Policy*, for DNR's current locational data sharing approaches and standards (http://www.dnr.state.wi.us/org/at/et/geo/datasharing/index.htm.) The Enterprise Data Management Section intends to update this data sharing document in the near future, adding and/or expanding its discussions about:

- issues and considerations associated with the sharing of locational data (e.g., accuracy, confidentiality, fees, file sizes and types, consulting services)
- new procedures and tools
- example language for formal data sharing contracts/agreements

XI. GLOSSARY OF TERMS

Accuracy: The closeness of results of observations, computations or estimates to the true values or the values accepted as being true. (U.S. Geological Survey, 1998).

Altitude: The perpendicular distance of a feature above a vertical reference datum, as defined in Federal Information Processing Standard 70-1. (modified from U.S. Geological Survey, 1998). The term "altitude" is used instead of elevation to conform to Federal Geographic Data Committee (FGDC) standards.

Area: A generic term for a bounded, continuous, two-dimensional object that may or may not include its boundary. (U.S. Geological Survey, 1998).

Attribute: A defined characteristic of an entity type. (U.S. Geological Survey, 1998).

Attribute Value: A specific quality or quantity assigned to an attribute. (U.S. Geological Survey, 1998).

Coordinates: Pairs of numbers expressing horizontal distances along orthogonal axes. (U.S. Geological Survey, 1998).

Data Element: A logically primitive item of data. (U.S. Geological Survey, 1998).

Data Record: A row of data in a database table.

Data Set: A collection of related data. (U.S. Geological Survey, 1998).

Datum: A mathematically defined reference surface used to represent the size and shape of the Earth. A horizontal datum is defined by its ellipsoid, latitude and longitude orientation, and a physical origin. (Wisconsin State Cartographer's Office, 1995)

Depth: Perpendicular distance of an interior point from the surface of an object (U.S. Geological Survey, 1998). Also, the perpendicular distance of a feature below a vertical reference datum.

Digital Image: A two-dimensional array of regularly spaced picture elements (pixels) constituting a picture. (U.S. Geological Survey, 1998).

Domain: Valid values for a data element. (U.S. Geological Survey, 1998).

Elevation: see Altitude.

Ellipsoid: A mathematical surface (an ellipse rotated around the Earth's polar axis) which provides a convenient model of the size and shape of the Earth. The ellipsoid is chosen to best meet the needs of a particular geodetic datum system design. (Wisconsin State Cartographer's Office, 1995).

False Easting / False Northing: A numerical constant used to eliminate negative coordinates in a system, or to change the coordinates to more convenient values. The false easting and/or northing values are assigned to the true origin of the projection system. (Wisconsin State Cartographer's Office, 1995).

False Northing: see **False Easting / False Northing**.

Geographic Coordinate System: The network of curved lines (latitude and longitude) representing the Earth's spherical surface. These coordinates are measured in angular values of degrees, minutes, and seconds, and are based on the equator and an arbitrary location of a prime meridian as the origin location. (Wisconsin State Cartographer's Office, 1995).

Geoid: An undulating surface represented by extending the Earth's mean sea level through the land areas. The geoid is a theoretical surface perpendicular at every point to the direction of gravity. (Wisconsin State Cartographer's Office, 1995).

Geospatial Data: see **Locational Data**

Grid: A two-dimensional set of grid cells forming a regular, or nearly regular, surface. A set of points arrayed in a pattern that forms a regular, or nearly regular, surface. (modified from U.S. Geological Survey, 1998).

Grid Cell: A two-dimensional object that represents the smallest non-divisible element of a grid. (U.S. Geological Survey, 1998).

Horizontal: Tangent to the geoid or parallel to a plane that is tangent to the geoid. (U.S. Geological Survey, 1998).

Latitude: Angular distance measured on a meridian north or south of the equator. (U.S. Geological Survey, 1998).

Locational Data: Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth. (modified from U.S. Geological Survey, 1998).

Longitude: Angular distance between the plane of a meridian east or west from the plane of the meridian of Greenwich, England. (U.S. Geological Survey, 1998).

Map: A spatial representation, usually graphic on a flat surface, of spatial phenomena. (U.S. Geological Survey, 1998).

Media: The physical devices used to record, store, and (or) transmit data.

Meridian: A great circle on the Earth that passes through the geographic poles. (U.S. Geological Survey, 1998).

Metadata: Data about the content, quality, condition, and other characteristics of data. (U.S. Geological Survey, 1998).

Origin: The true geodetic zero point of a coordinate system. The actual origin may be assigned arbitrary coordinate values (using false eastings and/or northings) to eliminate negative coordinates in the system. (Wisconsin State Cartographer's Office, 1995).

Pixel: Two-dimensional picture element that is the smallest nondivisible element of a digital image. (U.S. Geological Survey, 1998).

Precision: A statistical measure of repeatability, usually expressed as a variance or standard deviation (root mean square, RMS) of repeated measurements. (Robinson, A.H., R.D. Sale, J.L. Morrison, and P.C. Muehrcke, 1984).

Projection: The method used to transform and portray the curved surface of the Earth as a flat (map) surface. Although there are theoretically an infinite number of possible projections, a relatively small number are commonly used. Different projection systems have differing amounts and patterns of distortion. (Wisconsin State Cartographer's Office, 1995)

Rectangular Coordinate System: A network of two sets of straight parallel lines intersecting at right angles and superimposed on a map projection. The origin (zero point) is located based upon the area covered on the Earth. Coordinate values are usually expressed in feet or meters.

Resolution: The minimum difference between two independently measured or computed values which can be distinguished by the measurement or analytical method being considered or used. (U.S. Geological Survey, 1998).

Spatial Data: see **Locational Data**.

Spheroid: An ellipsoid that approximates a sphere is commonly referred to as a spheroid. see **Ellipsoid**.

Topology: The way in which geographical elements are linked together (Burrough, P.A., 1986)

Vertical: At right angles to the horizontal; vertical data includes altitude and depth. (U.S. Geological Survey, 1998).

XII. BIBLIOGRAPHY

Brinker, R.C. and P.R. Wolf. 1984. *Elemental surveying*. Seventh Edition. New York: Harper and Row, Publishers, Inc.

Burrough, P.A. 1986. *Principles of geographical information systems for land resources assessment*. New York: Oxford University Press.

Minnesota Land Management Information Center. 1999. *Positional accuracy handbook.* St. Paul, Minnesota. 💻available at website http://www.mnplan.state.mn.us/press/accurate.html

Robinson, A.H., R.D. Sale, J.L. Morrison, and P.C. Muehrcke. 1984. *Elements of cartography*. Fifth Edition. New York: John Wiley & Sons.

United States Geological Survey. 1998. *Content standard for digital geospatial metadata.* Reston, VA: Federal Geographic Data Committee. 💻available at website http://www.fgdc.gov/standards/status/textstatus.html

United States Geological Survey. 1993. *Digital elevation models: data users guide 5 (Retired).* Reston, VA.

United States Postal Service. 1997. *Publication 28: Postal addressing standards*. Washington, D.C. 💻 available at website http://pe.usps.gov/cpim/ftp/pubs/Pub28/pub28.pdf

Wisconsin Department of Natural Resources. 1996. *24K Landnet Spatial Database Technical Documentation*.

Wisconsin Department of Natural Resources. 1993. *Wisconsin DNR GIS database users guide.* Madison, WI.

Wisconsin Department of Natural Resources. 1993. *Wisconsin DNR GIS datasharing policy*. Madison, WI. 💻 available at website http://www.dnr.state.wi.us/org/at/et/geo/datasharing/index.htm

Wisconsin Land Information Association. 1999 (adopted). *Digital Parcel Mapping Data Content Standards*. Wildrose, WI. 💻 available at website http://www.wlia.org/standards.html

Wisconsin Land Information Association. 1995. *Parcel Geo-Locator Standard*. Wildrose, WI. 💻 available at website http://www.wlia.org/standards.html

Wisconsin State Cartographer's Office. 1995. *Wisconsin coordinate systems*. Madison, Wisconsin: Board of Regents of the University of Wisconsin System.

APPENDIX A: LOCATIONAL DATA FIELD DEFINITIONS

"ORIGINALLY COLLECTED" HORIZONTAL DATA FIELDS				
DATA FIELD NAME (30 and 10* character lengths)	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
{Program-defined Feature Identifier}	**Program-defined Feature Identifier:** Program-defined unique character or numeric identifier assigned to the feature being located. Example: WI Unique Well Number.	**Type:** {Prog-def} **Length:** {Prog-def} **Dec. Places:** 0 **Format:** {Prog-def}	Required record-level storage for all features, and metadata documentation for data set.	
ORIG_HRZ_COLL_MTHD_CODE ***OH_COL_MTH***	**Original Horizontal Collection Method Code:** Code indicating the method by which the feature's horizontal location was originally collected. **Domain:** See COLL_MTHD_ CODE in *Data Collection Method Codes (**Appendix B.1**)*.	**Data Type:** Character **Length:** 6 **Dec. Places:** 0 **Format:** AAA###; All capitalized	Required record-level storage for all features, and metadata documentation for data set.	
ORIG_HRZ_REF_SYS_CODE ***OH_REF_SYS***	**Original Horizontal Referencing System Code:** Code indicating the referencing system in which the feature's horizontal location was originally collected. **Domain:** See REF_ SYS_CODE in *Referencing System Codes* (***Appendix B.2***).	**Type:** Character **Length:** 5 **Dec. Places:** 0 **Format:** AA###; All capitalized	Required metadata documentation for data set. Required record-level storage for x-y coords in non-GIS systems and applications. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_HRZ_X_COORD_AMT ***OH_X_COORD***	**Original Horizontal X-Axis Coordinate Amount:** Originally collected *x-axis* coordinate for point features in a tabular database system or application. Includes Eastings and Longitudes.	**Type:** Numeric **Length:** Variable **Dec. Places:** Variable **Format**:	Required record-level storage for x coordinates in non-GIS system/applications.	
ORIG_HRZ_Y_COORD_AMT ***OH_Y_COORD***	**Original Horizontal Y-Axis Coordinate Amount:** Originally collected *y-axis* coordinate for point features in a tabular database system or application. Includes Northings and Latitudes.	**Type:** Numeric **Length:** Variable **Dec. Places:** Variable **Format:**	Required record-level storage for y coordinates in non-GIS systems/applications.	

"ORIGINALLY COLLECTED" HORIZONTAL DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
ORIG_HRZ_COLL_DATE ***OH_COL_DAT***	**Original Horizontal Collection Date:** Beginning date on which the feature's horizontal location was originally collected.	**Type:** Date **Length:** 8 **Dec. Places:** 0 **Format:** MMDDYYYY	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_HRZ_SRC_YEAR ***OH_SRC_YR*** **NOTE: Data field only applicable for some data collection methods!**	**Original Horizontal Source Year:** Year that the source (e.g., map, imagery, DOP), from which the feature's horizontal location was originally collected, was created, published, updated, revised, flown, etc.	**Type:** Numeric **Length:** 4 **Dec. Places:** 0 **Format:** YYYY	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_HRZ_SRC_DNOM_AMT ***OH_SRC_DNM*** **NOTE: Data field only applicable for some data collection methods!**	**Original Horizontal Source Denominator Amount:** Scale denominator of the source (e.g., map, DOP photo base) from which the feature's horizontal location was originally collected. Example: 24000 for 1:24,000 scale.	**Type:** Numeric **Length:** 10 **Dec. Places:** 0 **Format:**	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_HRZ_IMG_RSLN_AMT ***OH_IMG_RSL*** **NOTE: Data field only applicable for some data collection methods!**	**Original Horizontal Image Resolution Amount:** Pixel resolution of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's horizontal location was originally collected.	**Type:** Numeric **Length:** 10 **Dec. Places:** 0 **Format:**	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_HRZ_IMG_RSLN_UNITS ***OH_RSL_UNT*** **NOTE: Data field only applicable for some data collection methods!**	**Original Horizontal Image Resolution Units:** Pixel resolution unit of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's horizontal location was originally collected. ***Domain:*** MT = meters; FT = feet; KM = kilometers; MI = miles.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.

"ORIGINALLY COLLECTED" HORIZONTAL DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
FEAT_TYPE_CODE ***FEAT_TYPE***	**Feature Type Code:** Code indicating the type of feature being located. See discussion of *Feature Type Codes* in ***Appendix B.3***.	**Type:** Character **Length:** 6 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for some EPA reporting. Required metadata documentation for data set. Recommended record-level storage for all features.	
{Program-defined Site Identifier} ***{Program-defined}***	**Program-defined Site Identifier:** Program-defined unique character or numeric identifier assigned to the site (e.g., facility, property, area) at which the feature is being located. Examples: FID, DNR Property Code.	**Type:** {Prog-def} **Length:** {Prog-def} **Dec. Places:** 0 **Format:** {Prog-def}	Required record-level storage for some EPA reporting. Required metadata documentation for data set. Recommended record-level storage for all features.	
FEAT_GEOM_REP_CODE ***FEAT_GEOM***	**Feature Geometric Representation Code:** Code indicating how the feature being located is geometrically represented. **Domain:** See FEAT_GEOM_REP_CODE in *Feature Geometric Representation Codes* (***Appendix B.4***).	**Type:** Character **Length:** 6 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for some EPA reporting. Required metadata documentation for data set. Recommended record-level storage for all features.	
ORIG_HRZ_COLL_MTHD_TEXT ***OH_MTH_TXT***	**Original Horizontal Collection Method Text:** Additional detail about the method by which the feature's horizontal location was originally collected. See *Data Collection Method Codes* discussion (***Appendix B.1***).	**Type:** Character **Length:** 255 **Dec. Places:** 0 **Format:** All capitalized	Recommended record-level storage for applicable features and data collection method.	
ORIG_HRZ_COLL_TOOL_CODE ***OH_COLTOOL***	**Original Horizontal Collection Tool Code:** Code indicating the tool used during the original collection of the feature's horizontal location. **Domain:** See COLL_TOOL_CODE in *Data Collection Tool Codes* (***Appendix B.5***).	**Type:** Character **Length:** 8 **Dec. Places:** 0 **Format:** All capitalized	Recommended record-level storage for applicable features and data collection method.	
ORIG_HRZ_COLL_NAME ***OH_COL_NAM***	**Original Horizontal Collector Name:** DNR user ID (e.g., SMITHJ) or name of the person who originally collected the feature's horizontal location.	**Type:** Character **Length:** 30 **Dec. Places:** 0 **Format:** All capitalized	Recommended record-level storage for applicable features and data collection method.	

WISCONSIN TRANSVERSE MERCATOR (WTM) DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
WTM91_X_AMT ***WTM91_X***	**WTM91 Easting (X) Amount:** An unsigned, positive 8-digit number representing meters East of the WTM coordinate system y-axis based on the 1991 adjustment of the North American Datum of 1983 – GRS80 spheroid. Example: 652342.12.	**Type:** Numeric **Length:** 8 **Dec. Places:** 2 **Format:**	Required record-level storage for WTM91 Eastings in non-GIS systems and applications.	
WTM91_Y_AMT ***WTM91_Y***	**WTM91 Northing (Y) Amount:** An unsigned, positive 8-digit number representing meters North of the WTM coordinate system x-axis based on the 1991 adjustment of the North American Datum of 1983 – GRS80 spheroid. Example: 652342.12.	**Type:** Numeric **Length:** 8 **Dec. Places:** 2 **Format:**	Required record-level storage for WTM91 Northings in non-GIS systems and applications.	

LATITUDE/LONGITUDE (LL) DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
LL_LAT_DD_AMT ***LL_LAT_DD***	**Latitude Decimal Degree Amount:** Unsigned, positive number representing the decimal degrees of latitude North of the equator based on the WGS84 or GRS80 spheroid. Example: 42.1234567.	**Type:** Numeric **Length:** 9 **Dec. Places:** 7 **Format:**	Required record-level storage for Latitude (referenced to WGS84 or GRS80) in non-GIS systems/applications.	
LL_LONG_DD_AMT ***LL_LONG_DD***	**Longitude Decimal Degree Amount:** Signed, negative number representing the decimal degrees of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid. Example: -93.1234567.	**Type:** Numeric **Length:** 10 **Dec. Places:** 7 **Format:**	Required record-level storage for Longitude (referenced to WGS84 or GRS80) in non-GIS systems/applications.	

LATITUDE/LONGITUDE (LL) DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
LL_LAT_DEG_AMT ***LL_LAT_DEG***	**Latitude Degree Amount:** Unsigned, positive number representing degrees of latitude north of the equator based on the WGS84 or GRS80 spheroid. **WI Domain:** 42 through 47.	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Optional	
LL_LAT_MIN_AMT ***LL_LAT_MIN***	**Latitude Minute Amount:** Unsigned, positive number representing minutes of latitude north of the equator based on the WGS84 or GRS80 spheroid. **Domain:** 00 through 59.	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Optional	
LL_LAT_SCND_AMT ***LL_LAT_SCN***	**Latitude Second Amount:** Unsigned, positive number representing the decimal seconds of latitude north of the equator based on the WGS84 or GRS80 spheroid. **Domain:** 00.0000 through 59.9999.	**Type:** Numeric **Length:** 6 **Dec. Places:** 4 **Format:**	Optional	
LL_LONG_DEG_AMT ***LL_LON_DEG***	**Longitude Degree Amount:** Signed, negative number representing the degrees of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid. **Wisconsin domain:** -86 through –93.	**Type:** Numeric **Length:** 3 **Dec. Places:** 0 **Format:**	Optional	
LL_LONG_MIN_AMT ***LL_LON_MIN***	**Longitude Minute Amount:** Unsigned, positive number representing the minutes of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid. **Domain:** 00 through 59.	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Optional	
LL_LONG_SCND_AMT ***LL_LON_SCN***	**Longitude Second Amount:** Unsigned, positive number representing the decimal seconds of longitude West of the Prime (Greenwich) Meridian based on the WGS84 or GRS80 spheroid. **Domain:** 00.0000 through 59.9999.	**Type:** Numeric **Length:** 6 **Dec. Places:** 4 **Format:**	Optional	

PUBLIC LAND SURVEY SYSTEM (PLSS) DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
PLSS_RNG_DIR_NUM_CODE ***RNG_DIR_NO***	**PLSS Range Direction Numeric Code:** Numeric code for PLSS Range direction East or West of the 4th Principal Meridian. **Domain:** 2 = West, 4 = East.	**Type:** Numeric **Length:** 1 **Dec. Places:** 0 **Format:**	Required record-level storage for all PLSS descriptions in tabular and GIS systems and applications.	
PLSS_TWN_ID ***TWN_ID***	**PLSS Township Identifier:** PLSS Township (number) identifier. **Domain:** 1 through 53.	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Required record-level storage for all PLSS descriptions in tabular and GIS systems and applications.	
PLSS_RNG_ID ***RNG_ID***	**PLSS Range Identifier:** PLSS Range (number) identifier. **Domain:** 1 through 20 (West); 1 through 30 (East).	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Required record-level storage for all PLSS descriptions in tabular and GIS systems and applications.	
PLSS_SCTN_ID ***SCTN_ID***	**PLSS Section Identifier:** PLSS section (number) identifier. Store "0" when feature is located in a non-standard PLSS tract. **Domain:** 0 through 36	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Required record-level storage for all PLSS descriptions in tabular and GIS systems and applications.	
PLSS_Q1_SCTN_NUM_CODE ***Q1_SCTN_NO***	**PLSS Quarter-Section Numeric Code:** Numeric PLSS quarter-section code. Store "0" when feature is located in a non-standard PLSS tract. **Domain:** 0-9 (see *PLSS Quarter Codes* in ***Section V.3.a*** above).	**Type:** Numeric **Length:** 1 **Dec. Places:** 0 **Format:**	Required record-level storage for all PLSS descriptions in tabular and GIS systems and applications.	
PLSS_TRACT_TYPE ***PLS_TRACT***	**PLSS Tract Type:** Code representing the type of non-standard PLSS tract. Leading zero required. **Domain:** See *Special Tracts NOT Included in the PLSS* in ***Section V.3.a*** above.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for applicable PLSS descriptions in tabular and GIS systems and applications.	
PLSS_ENTITY_CODE ***PLS_ENTITY***	**PLSS Entity Code**: Code of the non-standard PLSS tract. Leading zero required. **Domain:** 000-999.	**Type:** Character **Length:** 3 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for applicable PLSS descriptions in tabular and GIS systems and applications.	

PUBLIC LAND SURVEY SYSTEM (PLSS) DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
PLSS_Q2_SCTN_NUM_CODE ***Q2_SCTN_NO***	**PLSS Quarter-Quarter-Section Numeric Code:** Numeric PLSS quarter-quarter-section code. Store "0" when feature is located in a non-standard PLSS tract. **Domain:** 0-9 (see *PLSS Quarter Codes* in ***Section V.3.a*** above).	**Type:** Numeric **Length:** 1 **Dec. Places:** 0 **Format:**	Recommended record-level storage for applicable PLSS descriptions in tabular and GIS systems and applications.	
DNR_CNTY_CODE ***DNR_CTY_CD***	**DNR County Code:** Numeric DNR code for the county in which the feature is located. **Domain:** See DNR_CNTY_CODE in the *County Codes* (***Appendix B.6***).	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Recommended record-level storage for applicable PLSS descriptions in tabular and GIS systems and applications.	
PLSS_DTRSQQ_CODE ***DTRSQQ***	**PLSS DTRSQQ Code:** Geo-code for PLSS description. Created by concatenating the contents of the following data fields (and adding leading zeros where appropriate): [PLSS_RNG_DIR_NUM_CODE] (1st digit); [PLSS_ TWN_ID] (2nd & 3rd digits); [PLSS_ RNG_ID] (4th & 5th digits); [PLSS_SCTN_ID] (6th & 7th digits); [PLSS_Q1_SCTN_NUM_CODE] (8th digit); [PLSS_Q2_SCTN_NUM_CODE] (9th digit). Example: 412230523.	**Type:** Numeric **Length:** 9 **Dec. Places:** 0 **Format:**	Recommended record-level storage for applicable PLSS descriptions in tabular and GIS systems and applications. Must be used when PLSS "centroid" look-up table geo-codes feature locations from PLSS descriptions.	
PLSS_Q3_SCTN_NUM_CODE ***Q3_SCTN_NO***	**PLSS Quarter-Quarter-Quarter-Section Numeric Code:** Numeric PLSS quarter-quarter-quarter-section code. Store "0" when feature is located in a non-standard PLSS tract. Must be equivalent to [PLSS_Q3_SCTN_ CHAR_CODE] value. **Domain:** 0-9 (see *PLSS Quarter Codes* in ***Section V.3.a*** above).	**Type:** Numeric **Length:** 1 **Dec. Places:** 0 **Format:**	Optional	
PLSS_Q4_SCTN_NUM_CODE ***Q4_SCTN_NO***	**PLSS Quarter-Quarter-Quarter-Quarter-Section Numeric Code:** Numeric PLSS quarter-quarter-quarter-quarter-section code. Store "0" when feature is located in a non-standard PLSS tract. Must be equivalent to [PLSS_Q4_SCTN_ CHAR_CODE] value. **Domain:** 0-9 (see *PLSS Quarter Codes* in ***Section V.3.a*** above).	**Type:** Numeric **Length:** 1 **Dec. Places:** 0 **Format:**	Optional	

PUBLIC LAND SURVEY SYSTEM (PLSS) DESCRIPTION DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
PLSS_RNG_DIR_CHAR_CODE ***RNG_DIR_CH***	**PLSS Range Direction Character Code:** Character code for the PLSS Range direction East or West of the 4th Principal Meridian. Must be equivalent to [PLSS_RNG_DIR_NUM_CODE]. **Domain:** W = West; E = East.	**Type:** Character **Length:** 1 **Dec. Places:** 0 **Format:** All capitalized	Optional	
PLSS_Q1_SCTN_CHAR_CODE ***Q1_SCTN_CH***	**PLSS Quarter-Section Character Code:** Character PLSS quarter-section code. Must be equivalent to [PLSS_Q1_SCTN_NUM_CODE] value. **Domain:** See *PLSS Quarter Codes* in ***Section V.3.a*** above.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Optional	
PLSS_Q2_SCTN_CHAR_CODE ***Q2_SCTN_CH***	**PLSS Quarter-Quarter-Section Character Code:** Character PLSS quarter-quarter-section code. Must be equivalent to [PLSS_Q2_SCTN_NUM_CODE] value. **Domain:** See *PLSS Quarter Codes* in ***Section V.3.a*** above.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Optional	
PLSS_Q3_SCTN_CHAR_CODE ***Q3_SCTN_CH***	**PLSS Quarter-Quarter-Quarter-Section Character Code:** Character PLSS quarter-quarter-quarter-section code. Must be equivalent to [PLSS_Q3_SCTN_NUM_CODE] value. **Domain:** See *PLSS Quarter Codes* in ***Section V.3.a*** above.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Optional	
PLSS_Q4_SCTN_CHAR_CODE ***Q4_SCTN_CH***	**PLSS Quarter-Quarter-Quarter-Quarter-Section Character Code:** Character PLSS quarter-quarter-quarter-quarter-section code. Must be equivalent to [PLSS_Q4_SCTN_NUM_CODE] value. **Domain:** See *PLSS Quarter Codes* in ***Section V.3.a*** above.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Optional	

PARCEL DESCRIPTION DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
DOR_CNTY_CODE ***DOR_CTY_CD***	**DOR County Code:** Wisconsin Department of Revenue (DOR) code for the county in which the feature is located**. Domain:** See DOR_CNTY_CODE values in *County Codes* (***Appendix B.6***).	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format:**	Required record-level storage for all parcel descriptions in tabular and GIS systems and applications.	
MUNI_TYPE_CODE ***MUNI_TYPE***	**Municipality Type Code:** Numeric code representing the type of municipality in which the parcel is located. **Domain:** 0 = Civil Town; 1 = Village; 2 = City. See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***).	**Type:** Numeric **Length:** 1 **Dec. Places:** 0 **Format:**	Required record-level storage for all parcel descriptions in tabular and GIS systems and applications.	
MCD_CODE ***MCD_CODE***	**Minor Civil Division Code:** Numeric code representing the minor civil division in which the parcel is located. **Domain:** See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***).	**Type:** Numeric **Length:** 2 **Dec. Places:** 0 **Format**	Required record-level storage for all parcel descriptions in tabular and GIS systems and applications.	
PLSS_RNG_DIR_NUM_CODE	**PLSS Range Direction Numeric Code**	See characteristics in *Public Land Survey System (PLSS) Data Fields* table above.	Required record-level storage for all parcel descriptions in tabular and GIS systems and applications.	
PLSS_TWN_ID	**PLSS Township Identifier**			
PLSS_RNG_ID	**PLSS Range Identifier**			
PLSS_SCTN_ID	**PLSS Section Identifier**			
PLSS_Q1_SCTN_NUM_CODE	**PLSS Quarter-Section Numeric Code**			
PLSS_Q2_SCTN_NUM_CODE	**PLSS Quarter-Quarter-Section Numeric Code**			
PLSS_TRACT_TYPE	**PLSS Tract Type**		Required record-level storage for applicable parcel descriptions in tabular and GIS systems and applications	
PLSS_ENTITY_CODE	**PLSS Entity Code**			
PARCEL_NO ***PARCEL_NO***	**Parcel Number:** Standard or non-standard parcel number assigned by county/local "Real Property" Lister. May include dashes.	**Type:** Character **Length:** 50 **Dec. Places:** 0 **Format:** Various	Required record-level storage for all parcel descriptions in tabular and GIS systems and applications.	

PARCEL DESCRIPTION DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
FIPS_CODE ***FIPS_CODE***	**Federal Information Processing System (FIPS) Code:** Numeric FIPS code. Created by concatenating the following data fields (and adding leading zeros where appropriate): [DOR_CNTY_CODE] (1st & 2nd digits); [MUNI_TYPE_CODE] (3rd digit); [MCD_CODE] (4th & 5th digits). **Domain:** See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***).	**Type:** Numeric **Length:** 5 **Dec. Places:** 0 **Format:**	Optional	

STREET ADDRESS DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
STREET_ADDR_1_TEXT ***ADDR_1_TXT***	**Street Address Line 1 Text:** The first line of street address, containing the following address components: number, pre-direction, street name, street suffix, post-direction. Example: 101 S WEBSTER ST.	**Type:** Character **Length:** 60 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for all street addresses in tabular and GIS systems and applications.	
STREET_ADDR_2_TEXT ***ADDR_2_TXT***	**Street Address Line 2 Text:** The second line of street address, containing the following address components: unit designator and unit number. Example: STE 24.	**Type:** Character **Length:** 30 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for applicable street addresses in tabular and GIS systems and applications.	
STREET_ADDR_MUNI_NAME ***ADDR_MUNI***	**Street Address Municipality Name:** Incorporated city, town, or village name. **Domain:** See ***DW_MCD*** table via the *DAMenu* application (***Section III.8***).	**Type:** Character **Length:** 20 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for all street addresses in tabular and GIS systems and applications.	
STREET_ADDR_STATE_ABBR ***ADDR_STATE***	**Street Address State Abbreviation:** The USPS U.S. state abbreviation. Example: WI.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for all street addresses in tabular and GIS systems and applications.	

STREET ADDRESS DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
STREET_ADDR_ZIP_CODE ***ADDR_ZIP***	**Street Address ZIP Code:** The USPS U.S. zip code. Examples: 53717 or 537171134.	**Type:** Numeric **Length:** 9 **Dec. Places:** 0 **Format:**	Required record-level storage for all street addresses in tabular and GIS systems and applications.	
STREET_ADDR_NO_DATA ***STREET_NUM***	**Street Address Number Data:** The street number containing the following address components: number. Example: 101	**Type:** Numeric **Length:** Variable **Dec. Places:** 0 **Format:**	Optional.	
STREET_ADDR_NAME_TEXT ***STREET_NAM***	**Street Address Name Text:** The street name, containing the following address components: pre-direction, street name, street suffix, post-direction: Example: S WEBSTER ST	**Type:** Character **Length:** 60 **Dec. Places:** 0 **Format:** All capitalized	Optional	
STREET_ADDR_UNIT_TEXT ***STREET_UNT***	**Street Unit Text:** The street address unit, containing the following address components: unit designator and unit number. Example: STE 24.	**Type:** Character **Length:** 30 **Dec. Places:** 0 **Format:** All capitalized	Optional	
STREET_FRGN_TERR_TEXT ***FRGN_TERR***	**Foreign Territory:** The USPS foreign territory name or code.	**Type:** Character **Length:** 20 **Dec. Places:** 0 **Format:** All capitalized	Optional	
STREET_FRGN_POST_CODE ***FRGN_PO_CD***	**Foreign Postal Code:** The USPS foreign territory postal code.	**Type:** Character **Length:** 20 **Dec. Places:** 0 **Format:** All capitalized	Optional	

"ORIGINALLY COLLECTED" VERTICAL DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
{Program-defined Feature Identifier}	**Program-defined Feature Identifier**	See characteristics in *"Originally Collected" Horizontal Data Fields* table above.	Required record-level storage for all features, and metadata documentation for data set.	
ORIG_VRT_COLL_MTHD_CODE ***OV_COL_MTH***	**Original Vertical Collection Method Code:** Code indicating the method by which the feature's vertical location was originally collected. **Domain:** See COLL_MTHD_ CODE in *Data Collection Method Codes (**Appendix B.1**)*.	**Data Type:** Character **Length:** 6 **Dec. Places:** 0 **Format:** AAA###; All capitalized	Required record-level storage for all features, and metadata documentation for data set.	
ORIG_VRT_REF_SYS_CODE ***OV_REF_SYS***	**Original Vertical Referencing System Code:** Code indicating the referencing system in which the feature's vertical location was originally collected. **Domain:** See REF_ SYS_CODE in *Referencing System Codes* (***Appendix B.2***).	**Type:** Character **Length:** 5 **Dec. Places:** 0 **Format:** AA###; All capitalized	Required record-level storage for all features and metadata documentation for data set.	
ORIG_VRT_COLL_DATE ***OV_COL_DAT***	**Original Vertical Collection Date:** Beginning date on which the feature's vertical location was originally collected.	**Type:** Date **Length:** 8 **Dec. Places:** 0 **Format:** MMDDYYYY	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_VRT_SRC_YEAR ***OV_SRC_YR*** **NOTE: Data field only applicable for some data collection methods!**	**Original Vertical Source Year:** Year that the source (e.g., map, imagery, DOP), from which the feature's vertical location was originally collected, was created, published, updated, revised, flown, etc.	**Type:** Numeric **Length:** 4 **Dec. Places:** 0 **Format:** YYYY	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_VRT_SRC_DNOM_AMT ***OV_SRC_DNM*** **NOTE: Data field only applicable for some data collection methods!**	**Original Vertical Source Denominator Amount:** Scale denominator of the source (e.g., map, DOP photo base) from which the feature's vertical location was originally collected. Example: 24000 for 1:24,000 scale.	**Type:** Numeric **Length:** 10 **Dec. Places:** 0 **Format:**	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.

"ORIGINALLY COLLECTED" VERTICAL DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
ORIG_VRT_IMG_RSLN_AMT ***OV_IMG_RSL*** **NOTE: Data field only applicable for some data collection methods!**	**Original Vertical Image Resolution Amount:** Pixel resolution of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's vertical location was originally collected.	**Type:** Numeric **Length:** 10 **Dec. Places:** 0 **Format:**	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
ORIG_VRT_IMG_RSLN_UNITS ***OV_RSL_UNT*** **NOTE: Data field only applicable for some data collection methods!**	**Original Vertical Image Resolution Units:** Pixel resolution unit of the raster source (e.g., satellite imagery, DOP, DRG) from which the feature's vertical location was originally collected. ***Domain:*** MT = meters; FT = feet; KM = kilometers; MI = miles.	**Type:** Numeric **Length:** Variable **Dec. Places:** 0 **Format:**	Required metadata documentation for data set. Recommended record-level storage for all features.	Required record-level storage for all features and metadata documentation for data set.
FEAT_TYPE_CODE	**Feature Type Code**	See characteristics in *"Originally Collected" Horizontal Data Fields* table above.	Required record-level storage for some EPA reporting. Required metadata documentation for data set. Recommended record-level storage for all features.	
{Program-defined Site Identifier}	**Program-defined Site Identifier**			
ORIG_VRT_COLL_MTHD_TEXT ***OV_MTH_TXT***	**Original Vertical Collection Method Text:** Additional detail about the method by which the feature's vertical location was originally collected. See *Data Collection Method Codes* discussion (***Appendix B.1***).	**Type:** Character **Length:** 255 **Dec. Places:** 0 **Format:** All capitalized	Recommended record-level storage for applicable features and data collection method.	
ORIG_VRT_COLL_TOOL_CODE ***OV_COLTOOL***	**Original Vertical Collection Tool Code:** Code indicating the tool used during the original collection of the feature's vertical location. **Domain:** See COLL_TOOL_CODE in *Data Collection Tool Codes* (***Appendix B.5***).	**Type:** Character **Length:** 8 **Dec. Places:** 0 **Format:** All capitalized	Recommended record-level storage for applicable features and data collection method.	
ORIG_VRT_COLL_NAME ***OV_COL_NAM***	**Original Vertical Collector Name:** DNR user ID (e.g., SMITHJ) or name of the person who originally collected the feature's vertical location.	**Type:** Character **Length:** 30 **Dec. Places:** 0 **Format:** All capitalized	Recommended record-level storage for applicable features and data collection method.	

ALTITUDE DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
ALTITUDE_AMT ***ALTD_AMT**	**Altitude Amount:** The altitude of a feature, measured in [ALTITUDE_UNITS], above the vertical datum specified in the [ORIG_VRT_REF_SYS_CODE] data field.	**Type:** Numeric **Length:** Floating **Dec. Places:** Floating **Format:**	Required record-level storage for altitude data in tabular and GIS systems and applications.	
ALTITUDE_UNITS ***ALTD_UNITS**	**Altitude Units:** Units in which the altitude of a feature is measured. **Domain**: MT = meters; FT = feet; and KM = kilometers; MI = miles.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for altitude data in tabular and GIS systems and applications.	

DEPTH DATA FIELDS				
DATA FIELD NAME	**DATA FIELD (& ELEMENT) DEFINITION / DOMAIN**	**DATA FIELD TYPE, LENGTH, & DECIMAL PLACES**	**HOMOGENEOUS DATA SET STORAGE REQUIREMENTS**	**HETEROGENEOUS DATA SET STORAGE REQUIREMENTS**
DEPTH_AMT ***DEPTH_AMT**	**Depth Amount:** The depth of a feature, measured in [DEPTH_UNITS], below the vertical datum specified in the [ORIG_VRT_REF_SYS_CODE] data field.	**Type:** Numeric **Length:** Floating **Dec. Places:** Floating **Format:**	Required record-level storage for altitude data in tabular and GIS systems and applications.	
DEPTH_UNITS ***DEPTH_UNIT**	**Depth Units:** Units in which the depth of a feature is measured. **Domain**: MT = meters; FT = feet; and KM = kilometers; MI = miles.	**Type:** Character **Length:** 2 **Dec. Places:** 0 **Format:** All capitalized	Required record-level storage for altitude data in tabular and GIS systems and applications.	

APPENDIX B: CODE "LOOKUP" TABLE LISTS

1. DATA COLLECTION METHOD CODES

This table lists standard horizontal and vertical locational data collection method codes. It also contains equivalent EPA codes where appropriate, and suggested domain values for recommended or optional "originally collected" horizontal [ORIG_HRZ_…] and vertical [ORIG_VRT_…] data fields are also listed. For example, values in the COLL_MTHD_TEXT column below are stored in the [ORIG_HRZ_COLL_MTHD_TEXT] or [ORIG_VRT_COLL_MTHD_TEXT] data field. "**No**" means the data element is not collected/stored for that method.

Collection Method Code COLL_MTHD_CODE	Collection Method Description COLL_MTHD_DESC	EPA Vert. Collection Method Code	EPA Horiz. Collection Method Code	Collection Method Text COLL_MTHD_TEXT	Collection Tool Code COLL_TOOL_CODE	Source Year SRC_YEAR	Source Denominator Amount SRC_DNOM_AMT	Image Resolution Amount IMG_RSLN_AMT and Units IMG_RSLN_UNITS
CNV001	Data provided to DNR in digital format from known source, and converted for DNR use (refer to metadata).	---	---	No				
GCD001	Geo-coded by Public Land Survey System (PLSS) quarter-quarter-section centroid.	--	035	Enter "geoflag" code from protraction.	PROTRACT or CENTROID or OTH_GCD	No		
GCD002	Geo-coded by Public Land Survey System (PLSS) quarter-section centroid.	--	023					
GCD003	Geo-coded by Public Land Survey System (PLSS) section centroid.	--	024					
GCD004	Geo-coded by Public Land Survey System (PLSS) township/range centroid.	--	---					
GCD005	Geo-coded by street address.	---	001	Enter Centrus "location" code.	CENTRUS or DYNAMAP or OTH_GCD	No		
GCD006	Geo-coded by nearest street intersection.	---	004					
GCD007	Geo-coded by census block group centroid.	---	009					
GCD008	Geo-coded by census block tract centroid.	---	010					
GCD009	Geo-coded by 9-digit zip code (zip+4) centroid.	---	037					
GCD010	Geo-coded by 7-digit zip code (zip+2) centroid.	---	038					
GCD011	Geo-coded by 5-digit zip code centroid.	---	026					

Collection Method Code COLL_MTHD_CODE	Collection Method Description COLL_MTHD_DESC	EPA Vert. Collection Method Code	EPA Horiz. Collection Method Code	Collection Method Text COLL_MTHD_TEXT	Collection Tool Code COLL_TOOL_CODE	Source Year SRC_YEAR	Source Denominator Amount SRC_DNOM_AMT	Image Resolution Amount IMG_RSLN_AMT and Units IMG_RSLN_UNITS
GCD012	Geo-coded by landmark name.		007	Describe as needed	No			
GCD013	Geo-coded by Wisconsin Department of Revenue (DOR) or other parcel centroid.	--	---					
GCD014	Geo-coded by minor civil division (MCD) centroid.	--	007					
GCD015	Geo-coded by other centroid.	--	---					
GCD016	Geo-coded by unknown centroid.	--	027	No				
GPS001	Global positioning system (GPS): Survey grade receiver stationary during data collection (i.e., carrier phase static relative position).	G1	012	Enter PDOP and spheroid (if other than WSG84 or GRS80)	TRIM_G2 or TRIM_G3 or TRIM_G3C or TRIM_TS or TRIM_XR or GARMIN or OTH_GPS	No		
GPS002	Global positioning system (GPS): Survey grade receiver moves during data collection (carrier phase kinematic relative position).	G2	013					
GPS003	Global positioning system (GPS): Mapping grade receiver with real-time differential correction using beacon receiver (pseudo range differential GPS or "DGPS").	G3	014					
GPS004	Global positioning system (GPS): Mapping grade receiver with post-processing differential correction.	G3	014					
GPS005	Global positioning system (GPS): Recreational grade receiver with real-time differential correction using beacon receiver (pseudo range differential GPS or "DGPS").	G3	014					
GPS006	Global positioning system (GPS): Mapping or recreational grade receiver with no differential correction and selective availability off (pseudo range standard position).	G5	016					
GPS007	Global positioning system (GPS): Mapping or recreational grade receiver with no differential correction and selective availability on (pseudo range standard position).	G6	017					

Collection Method Code COLL_MTHD_CODE	Collection Method Description COLL_MTHD_DESC	EPA Vert. Collection Method Code	EPA Horiz. Collection Method Code	Collection Method Text COLL_MTHD_TEXT	Collection Tool Code COLL_TOOL_CODE	Source Year SRC_YEAR	Source Denominator Amount SRC_DNOM_AMT	Image Resolution Amount IMG_RSLN_AMT and Units IMG_RSLN_UNITS
GPS008	Global positioning system (GPS): Receiver grade and/or differential correction procedures unknown.	--	028	No				
GPS009	Global positioning system (GPS): Mapping grade receiver used to collect data with offset (assumes GPS data are differentially corrected).	G3	014	Enter PDOP and spheroid (if other than WSG84 or GRS80)	TRIM_G2; TRIM_G3; TRIM_GC3; TRIM_TS; TRIM_XR; GARMIN; or OTH_GPS	No		
GPS010	Global positioning system (GPS): Recreational grade receiver in real-time mode used to collect data with offset.	G3	014					
GPS011	Global positioning system (GPS): Recreational grade receiver without real-time differential correction used to collect data with offset.	G5	016					
LOR001	Loran C radio receiver.	--	022	No				
MLT001	Multiple locational data collection methods or sources used for one feature.	--	---	Describe as needed in these data fields or in metadata.				
MLT002	Points composed of point data from different source(s) or collected using multiple methods.	---	---					
MLT003	Arcs composed of segments from different source(s) or collected using multiple methods.	---	---					
MLT004	Polygons composed of arcs from different source(s) or collected using multiple methods.	---	---					
MLT005	Route/Region feature composed of arcs/polygons from different source(s) or collected using multiple methods.	---	---					
OTH001	Other locational data collection method.	OT	---	Describe as needed in these data fields or in metadata.				
PAR001	Interpreted from parcel description (verbal description, metes & bounds, survey notes).	--	---	Describe as needed in these fields or metadata.	No			
SCN001	Scanning or vectorizing techniques.	--	---	Describe as needed in these data fields or in metadata.				

Collection Method Code COLL_MTHD_CODE	Collection Method Description COLL_MTHD_DESC	EPA Vert. Collection Method Code	EPA Horiz. Collection Method Code	Collection Method Text COLL_MTHD_TEXT	Collection Tool Code COLL_TOOL_CODE	Source Year SRC_YEAR	Source Denominator Amount SRC_DNOM_AMT	Image Resolution Amount IMG_RSLN_AMT and Units IMG_RSLN_UNITS
SCR001	Digitized on screen: feature published/ visible on digital orthophoto (DOP).	--	019	Describe zoom scale, snap tolerance, and other conditions as needed.	ARCVIEW or ARCINFO or ERDAS or OTH_SCR or SWIS1.5	Yes	Yes	Yes
SCR002	Digitized on screen: feature interpreted from digital orthophoto (DOP).	--	019					
SCR003	Digitized on screen: feature published/visible on USGS 7.5-minute digital raster graphic (DRG).	--	018					
SCR004	Digitized on screen: feature interpreted from USGS 7.5-minute digital raster graphic (DRG).	--	018					
SCR005	Digitized on screen: feature published/visible on digital vector data (e.g., hydrography, landnet).	--	021					No
SCR006	Digitized on screen: feature interpreted from digital vector data (e.g., hydrography, landnet).	--	021					
SCR007	Digitized on screen: feature published/visible on Landsat Thematic Mapper ™ satellite imagery.	--	033				No	Yes
SCR008	Digitized on screen: feature interpreted from Landsat Thematic Mapper ™ satellite imagery.	--	033					
SCR009	Digitized on screen: feature published/visible on SPOT satellite imagery.	--	031					
SCR010	Digitized on screen: feature interpreted from SPOT satellite imagery.	--	031					
SCR011	Digitized on screen: feature published/visible on scanned rectified aerial photograph.	--	019				Yes	
SCR012	Digitized on screen: feature interpreted from scanned rectified aerial photograph.	--	019					
SCR013	Digitized on screen: feature published/visible on scanned unrectified aerial photograph.	--	019					
SCR014	Digitized on screen: feature interpreted from scanned unrectified aerial photograph.	--	019					

Collection Method Code COLL_MTHD_CODE	Collection Method Description COLL_MTHD_DESC	EPA Vert. Collection Method Code	EPA Horiz. Collection Method Code	Collection Method Text COLL_MTHD_TEXT	Collection Tool Code COLL_TOOL_CODE	Source Year SRC_YEAR	Source Denominator Amount SRC_DNOM_AMT	Image Resolution Amount IMG_RSLN_AMT and Units IMG_RSLN_UNITS
SCR015	Digitized on screen: feature published/visible on other satellite imagery.	--	020	Describe zoom scale, snap tolerance, and other conditions as needed.	ARCVIEW or ARCINFO or ERDAS or OTH_SCR or SWIS1.5	Yes	No	Yes
SCR016	Digitized on screen: feature interpreted from other satellite imagery.	--	020					
SCR017	Digitized on screen: feature published/visible on other scanned or raster source.	--	021				Yes	
SCR018	Digitized on screen: feature interpreted from other scanned or raster source.	--	021					
SRV001	Classical terrestrial surveying techniques.	S1	025	Describe as needed	EDM or LSR_RNG or GEOD_TS or THEODLT	No		
SRV002	Calculated from COGO measurements.	--	025					
TAB001	Digitized on table: feature published/visible on map sheet (e.g., paper, mylar).	--	018	Describe as needed	ARCVIEW or ARCINFO or CAD or OTH_TAB	Yes	Yes	No
TAB002	Digitized on table: feature interpreted from map sheet (e.g., paper, mylar).	--	018					
TAB003	Digitized on table: feature published/visible on rectified aerial photograph (e.g., paper, film).	--	019					
TAB004	Digitized on table: feature interpreted from rectified aerial photograph (e.g., paper, film).	--	019					
TAB005	Digitized on table: feature published/visible on unrectified aerial photograph (e.g., paper, film).	--	019					
TAB006	Digitized on table: feature interpreted from unrectified aerial photograph (e.g., paper, film).	--	019					
TAB007	Digitized on table: feature published/visible on CAD diagram, blueprint, or construction plan sheet (e.g., paper, mylar).	--	021					
TAB008	Digitized on table: feature interpreted from CAD diagram, blueprint, or construction plan sheet (e.g., paper, mylar).	--	021					

Collection Method Code COLL_MTHD_CODE	Collection Method Description COLL_MTHD_DESC	EPA Vert. Collection Method Code	EPA Horiz. Collection Method Code	Collection Method Text COLL_MTHD_TEXT	Collection Tool Code COLL_TOOL_CODE	Source Year SRC_YEAR	Source Denominator Amount SRC_DNOM_AMT	Image Resolution Amount IMG_RSLN_AMT and Units IMG_RSLN_UNITS
TAB009	Digitized on table: feature published/visible on other paper, mylar or film source.	--	021	Describe as needed	ARCVIEW or ARCINFO or CAD or OTH_TAB	Yes	Yes	No
TAB010	Digitized on table: feature interpreted from other paper, mylar or film source.	--	021					
UNK001	Unknown/guess	--	027	No				
VRT001	Topographic map interpolation: feature altitude or depth published/visible on source map.	T1	---	Describe as needed	No	Yes	Yes	No
VRT002	Topographic map interpolation: feature altitude or depth interpreted from source map.	T1	---					
VRT003	Measured using precise leveling techniques with benchmark control points.	L1	---			No		
VRT004	Measured using leveling techniques with non-benchmark control points.	L2	---					
VRT005	Measured using trigonometric leveling techniques.	L3	---					
VRT006	Interpreted from digital elevation model (DEM).	--	---			Yes	Yes	Yes
VRT007	Photogrammetric techniques.	P1	---			No		
VRT008	Interpreted from digital terrain model (DTM).	--				Yes	No	Yes

2. REFERENCING SYSTEM CODES

Referencing System Code REF_SYS_CODE	Referencing System Name REF_SYS_NAME	Referencing System Description REF_SYS_DESC	Referencing System Type H = Horizontal V = Vertical
CC001	ADAMS_CCS_FEET	Adams County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC002	ADAMS_OTHR	Adams County other coordinate system (must provide parameter documentation).	H
CC003	ASHLND_CCS_FEET	Ashland County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC004	ASHLND_OTHR	Ashland County other coordinate system (must provide parameter documentation).	H
CC005	BARRON_CCS_FEET	Barron County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC006	BARRON_OTHR	Barron County other coordinate system (must provide parameter documentation).	H
CC007	BAYFLD_CCS_FEET	Bayfield County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC008	BAYFLD_OTHR	Bayfield County other coordinate system (must provide parameter documentation).	H
CC009	BROWN_CCS_FEET	Brown County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC010	BROWN_OTHR	Brown County other coordinate system (must provide parameter documentation).	H
CC011	BUFFAL_CCS_FEET	Buffalo County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC012	BUFFAL_OTHR	Buffalo County other coordinate system (must provide parameter documentation).	H
CC013	BURNET_CCS_FEET	Burnett County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC014	BURNET_OTHR	Burnett County other coordinate system (must provide parameter documentation).	H
CC015	CALUME_CCS_FEET	Calumet County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC016	CALUME_OTHR	Calumet County other coordinate system (must provide parameter documentation).	H
CC017	CHIPPE_CCS_FEET	Chippewa County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC018	CHIPPE_OTHR	Chippewa County other coordinate system (must provide parameter documentation).	H
CC019	CLARK_CCS_FEET	Clark County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC020	CLARK_OTHR	Clark County other coordinate system (must provide parameter documentation).	H
CC021	COLUMB_CCS_FEET	Columbia County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC022	COLUMB_OTHR	Columbia County other coordinate system (must provide parameter documentation).	H
CC023	CRAWFD_CCS_FEET	Crawford County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC024	CRAWFD_OTHR	Crawford County other coordinate system (must provide parameter documentation).	H
CC025	DANE_CCS_FEET	Dane County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC026	DANE_OTHR	Dane County other coordinate system (must provide parameter documentation).	H
CC027	DODGE_CCS_FEET	Dodge County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC028	DODGE_OTHR	Dodge County other coordinate system (must provide parameter documentation).	H
CC029	DOOR_CCS_FEET	Door County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC030	DOOR_OTHR	Door County other coordinate system (must provide parameter documentation).	H
CC031	DOUGLA_CCS_FEET	Douglas County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC032	DOUGLA_OTHR	Douglas County other coordinate system (must provide parameter documentation).	H
CC033	DUNN_CCS_FEET	Dunn County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC034	DUNN_OTHR	Dunn County other coordinate system (must provide parameter documentation).	H
CC035	EAUCLR_CCS_FEET	Eau Claire County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC036	EAUCLR_OTHR	Eau Claire County other coordinate system (must provide parameter documentation).	H

Referencing System Code REF_SYS_CODE	Referencing System Name REF_SYS_NAME	Referencing System Description REF_SYS_DESC	Referencing System Type H = Horizontal V = Vertical
CC037	FLOREN_CCS_FEET	Florence County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC038	FLOREN_OTHR	Florence other coordinate system (must provide parameter documentation).	H
CC039	FONDUL_CCS_FEET	Fond du Lac County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC040	FONDUL_OTHR	Fond du Lac County other coordinate system (must provide parameter documentation).	H
CC041	FOREST_CCS_FEET	Forest County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC042	FOREST_OTHR	Forest County other coordinate system (must provide parameter documentation).	H
CC043	GRANT_CCS_FEET	Grant County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC044	GRANT_OTHR	Grant County other coordinate system (must provide parameter documentation).	H
CC045	GREEN_CCS_FEET	Green County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC046	GREEN_OTHR	Green County other coordinate system (must provide parameter documentation).	H
CC047	GRNLAK_CCS_FEET	Green Lake County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC048	GRNLAK_OTHR	Green Lake County other coordinate system (must provide parameter documentation).	H
CC049	IOWA_CCS_FEET	Iowa County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC050	IOWA_OTHR	Iowa County other coordinate system (must provide parameter documentation).	H
CC051	IRON_CCS_FEET	Iron County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC052	IRON_OTHR	Iron County other coordinate system (must provide parameter documentation).	H
CC053	JACKSN_CCS_FEET	Jackson County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC054	JACKSN_OTHR	Jackson County other coordinate system (must provide parameter documentation).	H
CC055	JEFFER_CCS_FEET	Jefferson County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC056	JEFFER_OTHR	Jefferson County other coordinate system (must provide parameter documentation).	H
CC057	JUNEAU_CCS_FEET	Juneau County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC058	JUNEAU_OTHR	Juneau County other coordinate system (must provide parameter documentation).	H
CC059	KENOSH_CCS_FEET	Kenosha County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC060	KENOSH_OTHR	Kenosha County other coordinate system (must provide parameter documentation).	H
CC061	KEWAUN_CCS_FEET	Kewaunee County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC062	KEWAUN_OTHR	Kewaunee County other coordinate system (must provide parameter documentation).	H
CC063	LACROS_CCS_FEET	LaCrosse County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC064	LACROS_OTHR	LaCrosse County other coordinate system (must provide parameter documentation).	H
CC065	LAFAYT_CCS_FEET	Lafayette County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC066	LAFAYT_OTHR	Lafayette County other coordinate system (must provide parameter documentation).	H
CC067	LANGLD_CCS_FEET	Langlade County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC068	LANGLD_OTHR	Langlade County other coordinate system (must provide parameter documentation).	H
CC069	LINCLN_CCS_FEET	Lincoln County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC070	LINCLN_OTHR	Lincoln County other coordinate system (must provide parameter documentation).	H
CC071	MANITO_CCS_FEET	Manitowoc County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC072	MANITO_OTHR	Manitowoc County other coordinate system (must provide parameter documentation).	H
CC073	MARATH_CCS_FEET	Marathon County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC074	MARATH_OTHR	Marathon County other coordinate system (must provide parameter documentation).	H

Referencing System Code REF_SYS_CODE	Referencing System Name REF_SYS_NAME	Referencing System Description REF_SYS_DESC	Referencing System Type H = Horizontal V = Vertical
CC075	MARINT_CCS_FEET	Marinette County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC076	MARINT_OTHR	Marinette County other coordinate system (must provide parameter documentation).	H
CC077	MARQUE_CCS_FEET	Marquette County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC078	MARQUE_OTHR	Marquette County other coordinate system (must provide parameter documentation).	H
CC079	MENOMI_CCS_FEET	Menominee County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC080	MENOMI_OTHR	Menominee County other coordinate system (must provide parameter documentation).	H
CC081	MILWAU_CCS_FEET	Milwaukee County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC082	MILWAU_OTHR	Milwaukee County other coordinate system (must provide parameter documentation).	H
CC083	MONROE_CCS_FEET	Monroe County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC084	MONROE_OTHR	Monroe County other coordinate system (must provide parameter documentation).	H
CC085	OCONTO_CCS_FEET	Oconto County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC086	OCONTO_OTHR	Oconto County other coordinate system (must provide parameter documentation).	H
CC087	ONEIDA_CCS_FEET	Oneida County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC088	ONEIDA_OTHR	Oneida County other coordinate system (must provide parameter documentation).	H
CC089	OUTAGM_CCS_FEET	Outagamie County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC090	OUTAGM_OTHR	Outagamie County other coordinate system (must provide parameter documentation).	H
CC091	OZAUKE_CCS_FEET	Ozaukee County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC092	OZAUKE_OTHR	Ozaukee County other coordinate system (must provide parameter documentation).	H
CC093	PEPIN_CCS_FEET	Pepin County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC094	PEPIN_OTHR	Pepin County other coordinate system (must provide parameter documentation).	H
CC095	PIERCE_CCS_FEET	Pierce County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC096	PIERCE_OTHR	Pierce County other coordinate system (must provide parameter documentation).	H
CC097	POLK_CCS_FEET	Polk County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC098	POLK_OTHR	Polk County other coordinate system (must provide parameter documentation).	H
CC099	PORTAG_CCS_FEET	Portage County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC100	PORTAG_OTHR	Portage County other coordinate system (must provide parameter documentation).	H
CC101	PRICE_CCS_FEET	Price County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC102	PRICE_OTHR	Price County other coordinate system (must provide parameter documentation).	H
CC103	RACINE_CCS_FEET	Racine County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC104	RACINE_OTHR	Racine County other coordinate system (must provide parameter documentation).	H
CC105	RICHLD_CCS_FEET	Richland County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC106	RICHLD_OTHR	Richland County other coordinate system (must provide parameter documentation).	H
CC107	ROCK_CCS_FEET	Rock County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC108	ROCK_OTHR	Rock County other coordinate system (must provide parameter documentation).	H
CC109	RUSK_CCS_FEET	Rusk County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC110	RUSK_OTHR	Rusk County other coordinate system (must provide parameter documentation).	H
CC111	STCROI_CCS_FEET	Saint Croix County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H

Referencing System Code REF_SYS_CODE	Referencing System Name REF_SYS_NAME	Referencing System Description REF_SYS_DESC	Referencing System Type H = Horizontal V = Vertical
CC112	STCROI_OTHR	Saint Croix County other coordinate system (must provide parameter documentation).	H
CC113	SAUK_CCS_FEET	Sauk County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC114	SAUK_OTHR	Sauk County other coordinate system (must provide parameter documentation).	H
CC115	SAWYER_CCS_FEET	Sawyer County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC116	SAWYER_OTHR	Sawyer County other coordinate system (must provide parameter documentation).	H
CC117	SHAWAN_CCS_FEET	Shawano County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC118	SHAWAN_OTHR	Shawano County other coordinate system (must provide parameter documentation).	H
CC119	SHEBOY_CCS_FEET	Sheboygan County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC120	SHEBOY_OTHR	Sheboygan County other coordinate system (must provide parameter documentation).	H
CC121	TAYLOR_CCS_FEET	Taylor County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC122	TAYLOR_OTHR	Taylor County other coordinate system (must provide parameter documentation).	H
CC123	TREMPE_CCS_FEET	Trempealeau County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC124	TREMPE_OTHR	Trempealeau County other coordinate system (must provide parameter documentation).	H
CC125	VERNON_CCS_FEET	Vernon County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC126	VERNON_OTHR	Vernon County other coordinate system (must provide parameter documentation).	H
CC127	VILAS_CCS_FEET	Vilas County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC128	VILAS_OTHR	Vilas County other coordinate system (must provide parameter documentation).	H
CC129	WALWTH_CCS_FEET	Walworth County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC130	WALWTH_OTHR	Walworth County other coordinate system (must provide parameter documentation).	H
CC131	WASHBN_CCS_FEET	Washburn County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC132	WASHBN_OTHR	Washburn County other coordinate system (must provide parameter documentation).	H
CC133	WAUKES_CCS_FEET	Waukesha County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC134	WAUKES_OTHR	Waukesha County other coordinate system (must provide parameter documentation).	H
CC135	WAUPAC_CCS_FEET	Waupaca County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC136	WAUPAC_OTHR	Waupaca County other coordinate system (must provide parameter documentation).	H
CC137	WAUSHA_CCS_FEET	Waushara County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC138	WAUSHA_OTHR	Waushara County other coordinate system (must provide parameter documentation).	H
CC139	WASHIN_CCS_FEET	Washington County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC140	WASHIN_OTHR	Washington County other coordinate system (must provide parameter documentation).	H
CC141	WINNEB_CCS_FEET	Winnebago County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC142	WINNEB_OTHR	Winnebago County other coordinate system (must provide parameter documentation).	H
CC143	WOOD_CCS_FEET	Wood County Coordinate System (Wisconsin State Cartographer's Office, 1995).	H
CC144	WOOD_OTHR	Wood County other coordinate system (must provide parameter documentation).	H
GC001	PLSS_DESC	Public Land Survey System (PLSS) description.	H
GC002	STREET_ADDR	Street address.	H
GC003	PARCEL_DESC	Parcel description.	H
HZ001	HRZ_OTHR	Other horizontal referencing system. Must describe in the [ORIG_HRZ_ COLL_MTHD_TEXT] data field.	H
HZ002	HRZ_UNKNOWN	Unknown horizontal referencing system.	H
LL001	LL_DD	Latitude/longitude (LL) in decimal degrees (DD): WGS84 or GRS80 spheroid*.	H

Referencing System Code REF_SYS_CODE	Referencing System Name REF_SYS_NAME	Referencing System Description REF_SYS_DESC	Referencing System Type H = Horizontal V = Vertical
LL002	LL_OTHR_DD	Latitude/longitude (LL) in decimal degrees (DD): other spheroid (not WGS84 or GRS80).	H
LL003	LL_DMS	Latitude/longitude (LL) in degrees/minutes/seconds (DMS): WGS84 or GRS80 spheroid*.	H
LL004	LL_OTHR_DMS	Latitude/longitude (LL) in degrees/minutes/seconds (DMS): other spheroid (not WGS84 or GRS80).	H
LL005	LL_OTHR	Latitude/longitude (LL) in other notation (i.e., not DD or DMS). Must describe notation and/or non-standard spheroid in [ORIG_HRZ_COLL_MTHD_ TEXT] data field.	
ML001	MULTIPLE	Multiple referencing systems used for one feature	H
SP001	SP91_ZON_NORTH_METER	State Plane (SP) North zone: 1991 adjustment of North American Datum of 1983 - GRS80 spheroid. Expressed in meters.	H
SP002	SP91_ZON_CTRL_METER	State Plane (SP) Central zone: 1991 adjustment of North American Datum of 1983 - GRS80 spheroid. Expressed in meters.	H
SP003	SP91_ZON_SOUTH_METER	State Plane (SP) South zone: 1991 adjustment of North American Datum of 1983 - GRS80 spheroid. Expressed in meters.	H
SP004	SP83_ZON_NORTH_METER	State Plane (SP) North zone: North American Datum of 1983 - GRS80 spheroid. Expressed in meters.	H
SP005	SP83_ZON_CTRL_METER	State Plane (SP) Central zone: North American Datum of 1983 - GRS80 spheroid. Expressed in meters.	H
SP006	SP83_ZON_SOUTH_METER	State Plane (SP) South zone: North American Datum of 1983 - GRS80 spheroid. Expressed in meters.	H
SP007	SP83_ZON_NORTH_FEET	State Plane (SP) North zone: North American Datum of 1983 - GRS80 spheroid. Expressed in feet.	H
SP008	SP83_ZON_CTRL_FEET	State Plane (SP) Central zone: North American Datum of 1983 - GRS80 spheroid. Expressed in feet.	H
SP009	SP83_ZON_SOUTH_FEET	State Plane (SP) South zone: North American Datum of 1983 - GRS80 spheroid. Expressed in feet.	H
SP010	SP27_ZON_NORTH_FEET	State Plane (SP) North zone: North American Datum of 1927 - Clarke's spheroid of 1866. Expressed in feet.	H
SP011	SP27_ZON_CTRL_FEET	State Plane (SP) Central zone: North American Datum of 1927 - Clarke's spheroid of 1866. Expressed in feet.	H
SP012	SP27_ZON_SOUTH_FEET	State Plane (SP) South zone: North American Datum of 1927 - Clarke's spheroid of 1866. Expressed in feet.	H
UT001	UTM91_ZON_15_METER	Universal Transverse Mercator (UTM) zone 15: 1991 adjustment of North American Datum of 1983 - GRS80 spheroid.	H
UT002	UTM91_ZON_16_METER	Universal Transverse Mercator (UTM) zone 16: 1991 adjustment of North American Datum of 1983 - GRS80 spheroid.	H
UT003	UTM83_ZON_15_METER	Universal Transverse Mercator (UTM) zone 15: North American Datum of 1983 - GRS80 spheroid.	H
UT004	UTM83_ZON_16_METER	Universal Transverse Mercator (UTM) zone 16: North American Datum of 1983 - GRS80 spheroid.	H
UT005	UTM27_ZON_15_METER	Universal Transverse Mercator (UTM) zone 15: North American Datum of 1927 - Clarke's spheroid of 1866.	H
UT006	UTM27_ZON_16_METER	Universal Transverse Mercator (UTM) zone 16: North American Datum of 1927 - Clarke's spheroid of 1866.	H
UT007	UTM_UNKNOWN	Universal Transverse Mercator (UTM) zone unknown.	H
VR001	NAVD88_METER	North American Vertical Datum (NAVD) of 1988.	V
VR002	NGVD29_METER	National Geodetic Vertical Datum (NGVD) of 1929.	V
VR003	MSL_FEET	Mean sea level (MSL) vertical datum.	V
VR004	LTD_FEET	Local tidal datum (LTD).	V
VR005	ALTITUDE _OTHR	Other altitude referencing system (describe in [ORIG_HRZ_COLL_MTHD_TEXT] data field).	V
VR006	DEPTH_OTHR	Other depth referencing system (describe in [ORIG_HRZ_COLL_MTHD_TEXT] data field).	V
VR007	VRT_UNKNOWN	Unknown vertical referencing system.	V

Referencing System Code REF_SYS_CODE	Referencing System Name REF_SYS_NAME	Referencing System Description REF_SYS_DESC	Referencing System Type H = Horizontal V = Vertical
WT001	WTM91_METER	Wisconsin Transverse Mercator: 1991 adjustment of North American Datum of 1983 - GRS80 spheroid.	H
WT002	WTM83_METER	Wisconsin Transverse Mercator: North American Datum of 1983 - GRS80 spheroid.	H
WT003	WTM27_METER	Wisconsin Transverse Mercator: North American Datum of 1927 - Clarke's spheroid of 1866.	H

3. FEATURE TYPE CODES

Feature type codes describe the type of feature being located. Many DNR programs have developed lists of feature type codes to meet their specific business needs. A comprehensive, department-wide list, however, does not exist, and may be the focus of a future DNR strategic IT initiative. In some cases, EPA also requires that feature types be reported using specific EPA *Reference Point Codes*.

This standard defines the [FEAT_TYPE_CODE] data field for storing these codes. It also proposes that *Feature Type Codes* have the following format: 3 characters representing the general feature class (e.g., AGR – for agriculture related features, FOR – for waste related features) followed by a 3 digit (sequential) number for that feature class. Examples are listed below.

Developing an enterprise feature type list would help DNR programs consistently identify the types of real-world features being located, and help users better integrate data from multiple DNR sources. It will also facilitate object-oriented data modeling, and the development of standard symbol sets for presenting data to the public via the Internet.

Feature Type Code FEAT_TYPE_CODE	Feature Type Description FEAT_TYPE_DESC	EPA Reference Point Code
AGR001	animal feedlot / combined animal feed operations	040
AGR002	agricultural farming / farm field	---
AGR003	irrigation system	---
AGR004	manure storage (lined & unlined storage facilities)	---
AIR001	air release stack	006
AIR002	air release vent	007
AIR003	air monitoring station	029
AIR004	atmospheric emissions treatment unit	012
FOR001	forest (general)	---
FOR002	forest (demonstration)	---
FOR003	forest (experimental)	---
FOR004	fire tower	---

4. FEATURE GEOMETRIC REPRESENTATION CODES

Feature Geometric Representation Code FEAT_GEOM_REP_CODE	Feature Geometric Representation Code Description FEAT_GEOM_REP_DESC	EPA Geometric Type Code EPA_GEOM_TYPE_CODE
AREA	Area (Polygon)	003
DYNLIN	Dynamic Segmentation Linear Feature	005
DYNPT	Dynamic Segmentation Point Feature	---
LINE	Line	002
LINEAR	Linear Event	005
MULTPT	Multiple Point	001
NETWRK	Network	005
POINT	Point	001
POLLIN	Polygon/Line	004
REGION	Region	004
RASTER	Raster	---
ROUTE	Route	005

5. DATA COLLECTION TOOL CODES

Data Collection Tool Code COLL_TOOL_CODE	Data Collection Tool Description
ARCVIEW	ESRI ArcView tool.
ARCINFO	ESRI ArcInfo tool.
CAD	Computer Assisted Drafting tool.
CENTROID	*DTRSQQ_LUT* "centroid" look-up table for Public Land Survey System (PLSS): based on 1:24,000-scale Landnet data.
CENTRUS	Centrus Desktop™ for address standardization and geo-coding.
DYNAMAP	Dynamap2000/ArcView for address geo-coding.
EDM	Electronic distance measurer for classical terrestrial surveying.
ERDAS	ERDAS Professional™ image processing tool.
GARMIN	Garmin recreational grade GPS receiver.
GEOD_TS	Geodetic total station for classical terrestrial surveying.
LSR_RNG	Laser ranging for classical terrestrial surveying.
MULTIPLE	Multiple tools used to collect locational data for a feature.
OTH_GCD	Other geo-coding data collection tool.
OTH_GPS	Other global positioning sytsem (GPS) data collection tool.
OTH_IMG	Other raster image processing tool used on satellite imagery.
OTH_SCR	Other on-screen digitizing tool.
OTH_TAB	Other on-table digitizing tool.
PROJECT	DNR projections service.
PROTRACT	Protraction program from Public Land Survey System (PLSS): based on 1:100,000-scale Landnet data.
SWIS1.5	SWIS locator tool – version 1.5.
THEODLIT	Theodolite for classical terrestrial surveying.
TRIM_G2	Trimble GeoExplorer 2 - mapping grade GPS receiver.
TRIM_G3	Trimble GeoExplorer 3 - mapping grade GPS receiver with "beacon-on-a-belt" real-time receiver.
TRIM_G3C	Trimble GeoExplorer 3C - mapping grade GPS receiver.
TRIM_TS	Trimble "Total Station" 48000 - survey grade GPS receiver.
TRIM_XR	Trimble PathFinder Pro XR - mapping grade GPS receiver.

6. COUNTY CODES

County codes can also be found in the DW_COUNTY look-up table, accessed through the *DAMenu* application (http://intranet.dnr.state.wi.us/int/at/et/) as described in ***Section III.8***.

DNR County Code DNR_CNTY_CODE	County Code Name CNTY_NAME	DOR County Code DOR_CNTY_CODE	FIPS County Code FIPS_CNTY_CODE
1	ADAMS	1	001
2	ASHLAND	2	003
3	BARRON	3	005
4	BAYFIELD	4	007
5	BROWN	5	009
6	BUFFALO	6	011
7	BURNETT	7	013
8	CALUMET	8	015
9	CHIPPEWA	9	017
10	CLARK	10	019
11	COLUMBIA	11	021
12	CRAWFORD	12	023
13	DANE	13	025
14	DODGE	14	027
15	DOOR	15	029
16	DOUGLAS	16	031
17	DUNN	17	033
18	EAU CLAIRE	18	035
19	FLORENCE	19	037
20	FOND DU LAC	20	039
21	FOREST	21	041
22	GRANT	22	043
23	GREEN	23	045
24	GREEN LAKE	24	047
25	IOWA	25	049
26	IRON	26	051
27	JACKSON	27	053
28	JEFFERSON	28	055
29	JUNEAU	29	057
30	KENOSHA	30	059
31	KEWAUNEE	31	061
32	LACROSSE	32	063
33	LAFAYETTE	33	065
34	LANGLADE	34	067
35	LINCOLN	35	069
36	MANITOWOC	36	071
37	MARATHON	37	073
38	MARINETTE	38	075
39	MARQUETTE	39	077
40	MENOMINEE	72	078
41	MILWAUKEE	40	079
42	MONROE	41	081
43	OCONTO	42	083
44	ONEIDA	43	085
45	OUTAGAMIE	44	087
46	OZAUKEE	45	089
47	PEPIN	46	091
48	PIERCE	47	093

DNR County Code DNR_CNTY_CODE	County Code Name CNTY_NAME	DOR County Code DOR_CNTY_CODE	FIPS County Code FIPS_CNTY_CODE
49	POLK	48	095
50	PORTAGE	49	097
51	PRICE	50	099
52	RACINE	51	101
53	RICHLAND	52	103
54	ROCK	53	105
55	RUSK	54	107
56	SAINT CROIX	55	109
57	SAUK	56	111
58	SAWYER	57	113
59	SHAWANO	58	115
60	SHEBOYGAN	59	117
61	TAYLOR	60	119
62	TREMPEALEAU	61	121
63	VERNON	62	123
64	VILAS	63	125
65	WALWORTH	64	127
66	WASHBURN	65	129
67	WASHINGTON	66	131
68	WAUKESHA	67	133
69	WAUPACA	68	135
70	WAUSHARA	69	137
71	WINNEBAGO	70	139
72	WOOD	71	141
99	NON-WISC	99	999

APPENDIX C: DATA CONVERSION "CROSS-WALK" TABLES

1. METHOD CODES CROSSWALK TABLE

This crosswalk tables must be used in conjunction with program-developed "data conversion rules" to help ensure that all converted data and data fields continue to support that program's business needs. In some cases, there is not a one-to-one correlation between an "old" method code and a new one. For example, the scale has been removed from the old method descriptions, and is now stored in the [ORIG_HRZ_SRC_DNOM_AMT] data field.

Old Method Code	Old Method Code Description	New Original Horizontal Collection Method Code ORIG_HRZ_ COLL_MTHD_CODE	New Original Horizontal Source Denomin. Amount ORIG_HRZ_ SRC_DNOM_AMT
01	digitized from a map @ 1:2 million scale	TAB001	2,000,000
02	digitized from a map @ 1:1 million scale	TAB001	1,000,000
03	digitized from a map @ 1:500,000 scale	TAB001	500,000
04	digitized from a map @ 1:250,000 scale	TAB001	250,000
05	digitized from a map @ 1:126,720 scale	TAB001	126,720
06	digitized from a map @ 1:100,000 scale	TAB001	100,000
07	digitized from a map @ 1:63,360 scale	TAB001	63,360
08	digitized from a map @ 1:62,500 scale	TAB001	62,500
09	digitized from a map @ 1:24,000 scale	TAB001	24,000
10	digitized from a map @ larger than 1:24,000 scale	TAB001	<24,000
11	interpolated from a map @ 1:2 million scale	TAB002	2,000,000
12	interpolated from a map @ 1:1 million scale	TAB002	1,000,000
13	interpolated from a map @ 1:500,000 scale	TAB002	500,000
14	interpolated from a map @ 1:250,000 scale	TAB002	250,000
15	interpolated from a map @ 1:126,720 scale	TAB002	126,720
16	interpolated from a map @ 1:100,000 scale	TAB002	100,000
17	interpolated from a map @ 1:63,360 scale	TAB002	63,360
18	interpolated from a map @ 1:62,500 scale	TAB002	62,500
19	interpolated from a map @ 1:24,000 scale	TAB002	24,000
20	interpolated from a map @ larger than 1:24,000 scale	TAB002	<24,000
21	digitized from an aerial photo @ smaller than 1:60,000 scale	TAB003; TAB005	>60,000
22	digitized from an aerial photo @ 1:58,000 scale	TAB003; TAB005	58,000
23	digitized from an aerial photo @ 1:40,000 scale	TAB003; TAB005	40,000
24	digitized from an aerial photo @ 1:24,000 scale	TAB003; TAB005	24,000
25	digitized from an aerial photo @ 1:20,000 scale	TAB003; TAB005	20,000
26	digitized from an aerial photo @ 1:15,840 scale	TAB003; TAB005	15,840
27	digitized from an aerial photo @ larger than 1:15,000 scale	TAB003; TAB005	<15,000
28	interpolated from an aerial photo @ smaller than 1:60,000 scale	TAB004; TAB006	>60,000
29	interpolated from an aerial photo @ 1:58,000 scale	TAB004; TAB006	58,000
30	interpolated from an aerial photo @ 1:40,000 scale	TAB004; TAB006	40,000
31	interpolated from an aerial photo @ 1:24,000 scale	TAB004; TAB006	24,000
32	interpolated from an aerial photo @ 1:20,000 scale	TAB004; TAB006	20,000
33	interpolated from an aerial photo @ 1:15,840 scale	TAB004; TAB006	15,840
34	interpolated from an aerial photo @ larger than 1:15,000 scale	TAB004; TAB006	<15,000
35	determined from remote sensing imagery - unspecified type	UNK001	---
37	loran c radio receiver	LOR001	---
38	terrestrial surveying methods	SRV001; SRV002	---
39	global positioning system (GPS) survey methods - unspecified gps method	GPS008	---

Old Method Code	Old Method Code Description	New Original Horizontal Collection Method Code ORIG_HRZ_ COLL_MTHD_CODE	New Original Horizontal Source Denomin. Amount ORIG_HRZ_ SRC_DNOM_AMT
40	converted from a public land survey system (PLSS) description - unspecified plss units	UNK001	---
43	converted to plss quarter-quarter section from coordinate system (i.e., transverse mercator, state plane or geographic coordinates)	store appropriate "originally collected" data elements for "from" source.	---
44	from owner or propery description	PAR001	---
45	derived from local grid origin + offset coordinate	UNK001 contact source for "originally collected" data elements.	---
46	local grid origin assigned without local grid coordinates		
47	provided by local government agency	CNV001	---
50	GPS carrier phase static relative positioning technique	GPS001	---
51	GPS carrier phase kinematic relative positioning technique	GPS002	---
52	GPS code measurements (pseudo range) differential (DGPS)	GPS003; GPS005	---
53	GPS code measurements (pseudo range) precise positioning service	GPS004	---
54	GPS code measurements (pseudo range) standard positioning service - SA off	GPS006	---
55	GPS code measurements (pseudo range) standard positioning service - SA on	GPS007	---
60	geo-coded by street address	GCD005	---
61	geo-coded by landmark name	GCD012	---
62	geo-coded by nearest street intersection	GCD006	---
70	geo-coded by census block centroid	GCD007	---
71	geo-coded by census block group centroid	GCD007	---
72	geo-coded by census tract centroid	GCD008	---
73	geo-coded by minor civil division centroid	GCD014	---
74	geo-coded by zip code (5-digit)	GCD011	---
75	geo-coded by zip code (9-digit)	GCD009	---
76	geo-coded by (Department of Revenue) parcel centroid	GCD013	---
78	geo-coded by other government unit centroid	GCD015	---
80	geo-coded by centroid of PLSS township	GCD004	---
81	geo-coded by centroid of PLSS section	GCD003	---
82	geo-coded by centroid of PLSS quarter-section	GCD002	---
83	geo-coded by centroid of PLSS quarter-quarter-section	GCD001	---
90	digitized on-screen from digital orthophoto (DOP)	SCR001; SCR002	---
91	digitized on-screen from other rectified aerial photography or high-resolution satellite imagery	SCR007; SCR008; SCR009; SCR010; SCR011; SCR012	---
92	digitized on-screen from 7.5-minute digital raster graphics (DRG)	SCR003; SCR004	---
93	digitized on-screen from 1:24,000-scale digital vector data	SCR005; SCR006	24,000
94	digitized on-screen from digital vector or image data at source scales between 1:24,000 and 1:100,000	SCR005; SCR006	>24,000 - 100,000
95	digitized on-screen from digital vector or image data at source scales of1:100,000 or smaller	SCR005; SCR006	>100,000
98	best guess	UNK001	---
99	unknown	UNK001	---

2. DATA FIELDS CROSSWALK TABLE

This crosswalk tables must be used in conjunction with program-developed "data conversion rules" to help ensure that all converted data and data fields continue to support that program's business needs. In some cases, there is not a one-to-one correlation between an "old" data field and a "new" one. For example, accuracy is no longer captured in explicit data fields for each coordinate system, but, rather, is assessed based on the "new" data collection method codes or specific accuracy testing.

OLD DATA FIELD	HOW TO CONVERT…	NOTES
Survey_Range_Ndir	Redefine data field as **PLSS_RNG_DIR_NUM_CODE**	If feature locations originally collected in or derived from PLSS or parcel description, **ORIG_HRZ_REF_SYS_ CODE** = GC001 (PLSS_DESC) or GC003 (PARCEL_DESC). Leading zeros will disappear from data in the following "new" fields: **PLSS_TWN_ID**, **PLSS_RNG_ID**, **PLSS_SCTN_ID**, **DNR_CNTY_CODE**, and **DOR_ CNTY_CODE**.
Survey_Township	Redefine data field as **PLSS_TWN_ID**	
Survey_Range	Redefine data field as **PLSS_RNG_ID**	
Survey_Section	Redefine data field as **PLSS_SCTN_ID**	
Q_NSection	Redefine data field as **PLSS_Q1_SCTN_NUM_CODE**	
QQ_NSection	Redefine data field as **PLSS_Q2_SCTN_NUM_CODE**	
Parcel_No	Redefine data field as **PARCEL_NO**	
Nonstandard_Parcel_No	Move data to **PARCEL_NO**	
County_Code	Redefine data field as **DNR_CNTY_CODE** or **DOR_CNTY_CODE**. Verify what county codes were actually used and move data to appropriate data field.	
Muni_Type_Code	Redefine data field as **MUNI_TYPE_CODE**.	
MCD_Code	Redefine data field as **MCD_CODE**.	
PLSS_Method_Code	1. If feature originally located/derived using PLSS or parcel description, convert code and move data to **ORIG_HRZ_COLL_ MTHD_CODE**. Enter appropriate codes into **ORIG_HRZ_COLL_ TOOL_CODE** and **ORIG_HRZ_COLL_ MTHD_TEXT**, as recommended. 2. If features NOT originally located/derived using PLSS or parcel description, use code to track originally collected data.	
OLD DATA FIELD	**HOW TO CONVERT…**	**NOTES**
WTM_Northing	1. If WTM coordinates referenced to NAD91/HPGN (see "old" WTM_ Datum), redefine data field as **WTM91_Y_AMT**. These coordinates may also be stored in **ORIG_HRZ_Y_COORD_ AMT** as needed. 2. If features originally located by WTM83 or WTM27 (see "old" WTM_ Datum), move data to **ORIG_HRZ_Y_COORD_AMT**. 3. If coordinates NOT originally WTM83 or WTM27, project to WTM91 and store in **WTM91_Y_AMT**.	If feature locations originally collected in WTM coordinates, **ORIG_HRZ_REF_SYS_ CODE** = WT001, WT002, or WT003.
WTM_Easting	1. If WTM coordinates referenced to NAD91/HPGN (see "old" WTM_ Datum), redefine data field as **WTM91_X_AMT**. These coordinates may also be stored in **ORIG_HRZ_X_COORD_ AMT** as needed. 2. If features originally located by WTM83 or WTM27 (see "old" WTM_ Datum), move data to **ORIG_HRZ_X_COORD_AMT**. 3. If coordinates NOT originally WTM83 or WTM27, project to WTM91 and store in **WTM91_X_AMT**.	

WTM_Datum	Incorporated into "new" **ORIG_HRZ_REF_SYS_CODE**, **WTM91_X_ AMT** and **WTM91_Y_AMT** data fields.	
WTM_Method_Code	1. If features originally located by WTM coordinates, convert code and move data to **ORIG_HRZ_COLL_ MTHD_CODE**. Enter appropriate codes into **ORIG_HRZ_COLL_ TOOL_CODE** and **ORIG_HRZ_ COLL_MTHD_TEXT** as recommended. 2. If features NOT originally located by WTM coordinates, use code to track originally collected data.	
WTM_Accuracy	Accuracy based on new **ORIG_HRZ_COLL_MTHD_ CODE** or specific accuracy testing results.	
OLD DATA FIELD	**HOW TO CONVERT…**	**NOTES**
N_Lat_DD	1. If LL coordinates referenced to WGS84 or GRS80 spheroid, redefine data field as **LL_LAT_DD_AMT**. These coordinates may also be stored in **ORIG_HRZ_X_COORD_ AMT** as needed. 2. If LL coordinates originally collected in reference to another spheroid, move data to **ORIG_HRZ_X_COORD_AMT** and note spheroid in **ORIG_HRZ_ COLL_MTHD_TEXT**.	If feature locations originally collected in LL coordinates, **ORIG_HRZ_ REF_SYS_ CODE** = LL001, LL002, LL003, LL004, or LL005. If LL coordinates are referenced to a datum (see "old" Lat_Long_ Datum), rather than a spheroid, assume that the NAD91 or NAD83 datum = GRS80 spheroid. All other datums and non-WGS84 or GRS80 spheroids should be entered in **ORIG_HRZ_ COLL_MTHD_ TEXT**.
W_Lon_DD	1. If LL coordinates referenced to WGS84 or GRS80 spheroid, redefine data field as **LL_LONG_DD_AMT**. These coordinates may also be stored in **ORIG_HRZ_Y_COORD_ AMT** as needed. 2. If LL coordinates originally collected in reference to another spheroid, move data to **ORIG_HRZ_Y_COORD_AMT** and note spheroid in **ORIG_HRZ_ COLL_MTHD_TEXT**.	
Lat_Degree	Redefine data field as **LL_LAT_DEG_AMT**	
Lat_Minute	Redefine data field as **LL_LAT_MIN_AMT**	
Lat_Second	Redefine data field as **LL_LAT_SCND_AMT**	
Long_Degree	Redefine data field as **LL_LONG_DEG_AMT**	
Long_Minute	Redefine data field as **LL_LONG_MIN_AMT**	
Long_Second	Redefine data field as **LL_LONG_SCND_AMT**	
Lat_Long_Datum	Incorporated into "new" **ORIG_HRZ_REF_SYS_CODE**.	
Lat_Long_Method_Code	1. If features originally located by LL coordinates, convert code and move data to **ORIG_HRZ_COLL_ MTHD_CODE**. Enter appropriate codes into **ORIG_HRZ_COLL_ TOOL_CODE** and **ORIG_HRZ_ COLL_MTHD_TEXT** as recommended. 2. If features NOT originally located by LL coordinates, use code to track originally collected data.	
Lat_Long_Accuracy	Accuracy based on new **ORIG_HRZ_COLL_MTHD_ CODE** or specific accuracy testing results.	
OLD DATA FIELD	**HOW TO CONVERT…**	**NOTES**
TM_Northing	1. If features originally located by UTM, move data to **ORIG_HRZ_ Y_COORD_AMT**. 2. If features NOT originally located by UTM coordinates, use code to track originally collected data, or project to WTM91 and store in **WTM91_Y_AMT**.	If feature locations originally collected in UTM coordinates, **ORIG_HRZ_ REF_SYS_ CODE** = UT001, UT002, UT003, UT004, UT005, or UT006, depending on TM_Datum and TM_Zone values.
TM_Easting	1. If features originally located by UTM, move data to **ORIG_HRZ_ X_COORD_AMT**. 2. If features NOT originally located by UTM coordinates, use code to track originally collected data, or project to WTM91 and store in **WTM91_X_AMT**.	
TM_Zone	Incorporated into "new" **ORIG_HRZ_REF_SYS_CODE**.	
TM_Datum	Incorporated into "new" **ORIG_HRZ_REF_SYS_CODE**.	

TM_Method_Code	1. If features originally located by UTM coordinates, convert code and move data to **ORIG_HRZ_COLL_ MTHD_CODE**. Enter appropriate codes into **ORIG_HRZ_COLL_ TOOL_CODE** and **ORIG_HRZ_ COLL_MTHD_TEXT** as recommended. 2. If features NOT originally located by WTM coordinates, use code to track originally collected data.	
TM_Accuracy	Accuracy based on new **ORIG_HRZ_COLL_MTHD_ CODE** or specific accuracy testing results.	
OLD DATA FIELD	**HOW TO CONVERT…**	**NOTES**
SP_Northing	1. If features originally located by SP, move data to **ORIG_HRZ_ Y_COORD_AMT**. 2. If features NOT originally located by SP coordinates, use code to track originally collected data, or project to WTM91 and store in **WTM91_Y_AMT**.	If feature locations originally collected in SP coordinates, **ORIG_HRZ_ REF_SYS_ CODE** = SP001, SP002, SP003, SP004, SP005, SP006, SP007, SP008, or SP009, depending on SP_Datum and SP_Zone values.
SP_Easting	1. If features originally located by UTM, move data to **ORIG_HRZ_ X_COORD_AMT**. 2. If features NOT originally located by UTM coordinates, use code to track originally collected data, or project to WTM91 and store in **WTM91_X_AMT**.	
SP_Zone	Incorporated into "new" **ORIG_HRZ_REF_SYS_CODE**.	
SP_Datum	Incorporated into "new" **ORIG_HRZ_REF_SYS_CODE**.	
SP_Method_Code	1. If features originally located by SP coordinates, convert code and move data to **ORIG_HRZ_COLL_ MTHD_CODE**. Enter appropriate codes into **ORIG_HRZ_COLL_ TOOL_CODE** and **ORIG_HRZ_ COLL_MTHD_TEXT** as recommended. 2. If features NOT originally located by WTM coordinates, use code to track originally collected data.	
SP_Accuracy	Accuracy based on new **ORIG_HRZ_COLL_MTHD_ CODE** or specific accuracy testing results.	

APPENDIX D: USAGE NOTES

1. CHECK FOR UPDATES ON DNR WEB PAGE PERIODICALLY!

This ***Locational Data Standards*** document is used throughout the DNR. Occasionally, users find typos or other errors in this document. In other cases, new standards are developed or existing standards are updated to support program business needs. These additions and updates are periodically incorporated into DNR's Locational Data Standards document, which is then re-released as a new version. Please check the **DNR's Locational Data Standards** web page (http://www.dnr.state.wi.us/org/at/et/geo/location/loc_stds.html) periodically to ensure that you are referring to the most current version of these standards! This web site also provides a list of pages that have been updated in the current version of the document, and a brief description of the changes that were made on those pages.

2. 30-CHARACTER VERSUS 10-CHARACTER DATA FIELD NAMES

Each standard data field defined in ***Appendix A*** of this document has two names. The first (longer) name is intended for use in Oracle and Access database tables. This name meets DNR database naming standards, including Oracle's 30-character data field name length limitation. The second name, noted by an asterisk (*), is 10-characters or less in length. This data field name is intended for use in ArcView applications that store attribute data in D:Base tables. D:Base, the native ArcView database, limits data field names to a maximum of 10 characters.

3. DEFINING THE LENGTH OF NUMERIC DATA FIELDS

The lengths of numeric data fields defined in ***Appendix A*** of this document are intended for use in Oracle and Access database tables. These database management systems do not require the user to define a space for the decimal point or the numeric sign (i.e., + or -). Arcview users storing attribute data in D:Base tables, however, must increase the length of each numeric field to accommodate storage of the decimal point (add one to the length) and, if necessary, the sign (add one to the length).

> **Example:** The length of WTM91_X_AMT is defined as 8, with 2 digits right of the decimal point (e.g., 652342.12). In ArcView, the user must define this numeric data field with a length of 9 to accommodate the six digits left of the decimal point + the decimal point + the two digits right of the decimal point.